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Computer-assisted Therapy in Psychiatry: Be Brave—It's a New World

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Abstract

The capacity to deliver some forms of behavioral treatment via computers may prove to be a small revolution in the delivery of mental health care. Although early research on the efficacy of these approaches has yielded mixed results, this new strategy offers tremendous potential to provide empirically supported therapies to many individuals who would never access psychiatric care, to extend the time and expertise of clinicians, and to offer improved care and monitoring. However, the great promise of computer-assisted therapies may be diminished if their benefits are overstated or if they are broadly released or disseminated before being carefully evaluated using the same methodologic standards that are requirements for evaluating clinician-delivered therapies. In this article, we review the current status of empiric support for computer-assisted therapies, advocating for enhanced rigor to identify those that are most effective, as well as the need to more thoroughly assess possible adverse effects, recognizing that even a modestly effective computer-assisted intervention could have enormous impact.

Keywords

Computer-assisted therapy; Technology; Psychotherapy; E-therapy

Introduction

Computer-assisted therapies—that is, the use of computers to deliver some aspects of psychotherapy or behavioral treatment directly to patients via interaction with a computer program, or delivered via the Internet—offer exciting prospects to address at least some of the multiple challenges facing psychiatry. Through their broad and ready availability, potential cost savings, and ability to extend to underserved or difficult-to-reach populations, computer-assisted therapies may greatly expand the range and repertoire of psychiatry and extend exciting new opportunities to clinicians and clinical researchers. To date, more than 100 different computer-assisted therapy programs have been developed for a range of mental disorders and behavioral health problems [1•].

It is of note that the bulk of these have been developed and evaluated outside the United States (primarily in the United Kingdom, Australia and New Zealand, and The Netherlands), and computer-assisted therapy is now offered as a first-line treatment in some countries. For example, *Beating the Blues*, a computer-assisted therapy for depression [2,3], was recommended by the National Institute for Clinical Excellence in 2006 as a first-line treatment

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in the United Kingdom [4–6]. One advantage of the relative lag in the United States in terms of adoption of computer-assisted therapies is that this affords psychiatrists in the United States a unique opportunity to reflect on the possibilities offered by computer-assisted therapies, to learn from the broader worldwide experience with these approaches, and to carefully consider how they should be evaluated and under what conditions and standards they should be disseminated.

Hence, in this review, we summarize the current status of the emerging literature on the efficacy of computer-assisted therapies. We outline several models for their use in psychiatry; then review the status of clinical research in this area for the psychiatric disorders for which they have been developed (primarily depression, anxiety, and addiction disorders); and conclude with a discussion of the potential problems, cautions, and unanswered questions regarding the use of computer-assisted therapies.

What Are Computer-assisted Therapies?

First, it is essential to recognize that this term refers only to a novel mode of delivering some form of intervention and conveys nothing about the nature, quality, or efficacy of the intervention itself. In many ways, the current level of development of computer-assisted treatments is reminiscent of the state of psychotherapy research in the 1980s, during which psychotherapies were only beginning to be systematically defined or evaluated [7]. Enormous variability exists with regard to the availability of computer-assisted approaches for a range of disorders, as well as in terms of what and how these approaches are delivered, their quality, and the extent to which they approximate other effective interventions or evidence-based treatments [1,8,9].

Computer-assisted therapies can be delivered via a program that resides on the device itself (including personal computers and laptops, personal digital assistants, interactive telephone messaging, and text messaging), or via the Internet, which often allows a higher degree of interactivity between the user and the program. Complexity of content can range from very minimal, text-based formats (much like reading a brochure) to highly sophisticated, interactive, virtual reality formats [10,11], which are more readily available because of the increase in high-speed Internet connections. Variability of level of involvement with a clinician or peers is another important dimension of these programs; existing programs range from no clinician involvement to those that offer peer support through moderated chat rooms to those with an extremely high level of clinician involvement, wherein the user and clinician interact extensively through e-mail correspondence. The latter approach is usually referred to as *e-therapy*; because e-therapies have been reviewed recently elsewhere [12], they are not discussed further in this article. Several computer-assisted therapies are “stand alone”—that is, they are intended for users to access them without necessarily engaging in other forms of intervention or therapist contact, while others are intended only as adjuncts to formal treatment. Intensity can range from those offering only very brief, single-session assessment and feedback, which take only minutes to complete, to programs with multiple complex modules that can take several weeks or months to work through.

The goals and intended outcomes of computer-assisted therapies vary extensively as well, often depending upon whether they are directed at general populations (which usually implies the intervention is targeting individuals with lower levels of the disorder or problem) to clinical populations with complex mental disorders and comorbid problems (typically delivered in clinic as an addition to treatment). Some computer-assisted therapies are conceived essentially as “online bibliotherapy,” in which the user is given access to information about the disorder or treatment, or provided with a range of resources and links to further assistance (eg, <http://www.quitnet.com>). Other computer-assisted therapies offer exposure to more

comprehensive, empirically validated therapies, such as cognitive-behavioral therapy (CBT), with extensive utilization of multimedia features such as videotaped examples to demonstrate skills with interactive exercises that allow users to assess their learning and practice new strategies.

Strengths of Computer-assisted Therapy

The excitement engendered by computer-assisted therapies revolves around their novelty and many advantages. First, computer-assisted therapies are available at the user's convenience, at any time, and thus are much less restrained by clinical hours and locations. Users can seek support or intervention at times they are most needed and, hence, most effective and expedient. Second, although most individuals who have psychiatric problems do not seek treatment [13], practical strategies to address this unmet need have been limited. On the other hand, more than 70% of Americans have access to the Internet (<http://www.internetusagestats.com>)—many times more than will ever seek treatment for a mental disorder or problem. The “digital gap” is diminishing; thus, levels of Internet access and usage are rising among the poor, those in rural communities, and in other underserved populations. Third, individuals with mental disorders frequently do not wish to reveal their symptoms or seek treatment [14]; the relative anonymity of computer-assisted therapies offers multiple advantages in this regard [15]. Furthermore, in-home accessibility offers distinct advantages for individuals whose symptoms limit their mobility (eg, agoraphobics, those with physical disabilities).

Fourth, there is a shortage of clinicians trained to deliver empirically validated therapies, and computer-assisted delivery may be an important strategy to bridge the gap between the impetus for delivery of empirically supported therapies and their utilization in clinical practice. Fifth, computer-assisted therapies are likely to be cost-effective. Although development of a computer-assisted therapy is a complex and costly undertaking, once developed, computer-assisted therapies are comparatively less expensive to deliver [16,17]. Moreover, they do so at a standardized, consistent level of quality that is difficult to achieve in clinical practice. Sixth, trends are moving toward growing caseloads and less time spent with individual patients; hence, delegation of some routine clinical tasks to computers may be an important means of greatly extending clinicians' time [18]. Finally, computers may accomplish some tasks more effectively than busy clinicians whose time is at a premium. For example, computers may be more thorough in some aspects of clinical assessment in that, unlike live interviewers, computers will omit sections of diagnostic interviews only when programmed to do so. Similarly, the multimedia capabilities of computers offer new possibilities for conveying complex skills to people with a variety of learning styles and cognitive abilities. They can do so through videotaped demonstrations and interactive exercises that allow users to see examples of others using the skill rather than simply hearing an abstract explanation from a clinician. Finally, in many contexts, individuals may be more willing to provide sensitive information to a computer than to a clinician [15].

How Might Computer-assisted Therapies Be Used in Psychiatry?

Given their flexibility, computer-assisted therapies might be used in any number of ways to enhance and extend psychiatric treatment, some of which we outline below. It should be noted, however, that this is very much a list of possibilities rather than existing options, and computer-assisted therapies have not yet been validated for many of these applications.

As “Clinician Extenders”

The most common strategy for evaluating computer-assisted therapies, and the model with the strongest level of empiric support at present, is as an adjunct to standard treatment. In this model, the patient receives assessment, support, monitoring, and intervention as usual from

the clinician; however, the patient also accesses the computer-assisted treatment to receive additional intervention or to complement standard care. One example of this approach is our work on computer-assisted CBT (CBT4CBT) to improve outcomes for standard treatment of addiction [19]. CBT4CBT provides seven modules, covering the basics of CBT for addiction treatment drawn from a published, validated manual [20]. We developed this model because of the scarcity of adequate implementation of CBT in addictions treatment [21] as well as the challenges associated with training sufficient numbers of addiction counselors to use CBT effectively [22]. Thus, CBT4CBT allows clinicians and treatment programs to provide multiple aspects of standard care to their patients (urine monitoring, pharmacotherapy, case management, and counseling), while delivery of CBT is essentially “subcontracted” to the computer. This allows providers to save considerable clinician time while still providing their patients with exposure to a form of an evidence-based approach.

A similar model involves using computer-assisted therapies to help clinicians address patients with complex or multiple disorders. That is, most clinicians can only specialize in a few disorders and have expertise or extensive training in a limited number of empirically supported approaches. It is unrealistic to expect any single clinician to master the almost overwhelming number of empirically supported therapies [23]; hence, computer-assisted therapies could play a role in extending clinicians’ expertise and enable them to offer more integrated, comprehensive treatments that address multiple issues. Thus, depression specialists might complement treatment by offering computer-assisted addiction treatment to their depressed patients who also drink or use drugs, or a specialty addiction clinic could integrate computerized post-traumatic stress disorder treatments to broaden the scope of services offered to the many individuals with comorbid addiction and post-traumatic stress disorder, and so on. Given the high rates of smoking and associated morbidities among individuals with mental health disorders [24,25], it arguably should become standard practice to refer all patients to a computerized smoking cessation program, which could be done at virtually no cost but could offer extraordinary benefit and health care cost savings.

This leads to the possibility that the role of the individual clinician could eventually evolve into one that involves, in addition to providing treatment for the presenting complaint or problem, assessing his or her patients for a range of psychiatric disorders and related problems, including behavioral health issues (eg, insomnia, obesity) [26,27]. The clinician could then provide the patient with the links to the appropriate, validated, computer-assisted resource for the identified comorbid problems, acting in a sense as the patient’s “general contractor” for mental and behavioral health in order to integrate, individualize, and enhance the patient’s care.

To Extend the Benefits of Treatment

Computer-assisted therapies may be used to extend the benefit of acute treatment episodes. Individuals completing intensive outpatient or inpatient hospitalizations too often fail to follow through on referrals for aftercare or continuing care, problems often exacerbated in cases in which patients live far from the hospital. Given that most psychiatric disorders are characterized by a chronic or relapsing course, computer-assisted therapies could thus be used to extend care and improve long-term outcomes. Thus, individuals completing an episode of care might be provided with links to computer-assisted approaches that could be used to help patients manage and monitor their symptoms and to alert their clinicians to early signs of relapse.

To Link Systems of Care

Given findings that many more individuals with psychiatric disorders access the primary care rather than the mental health system, extensive efforts have been made in recent years to bridge the mental health, substance abuse, and health care delivery systems. In the area of substance use and addiction, these approaches are referred to as Screening, Brief Intervention, and

Referral to Treatment (SBIRT), in which individuals at risk of substance use problems are systematically identified at a primary care setting such as an emergency department or general practice; provided a brief intervention with advice to stop their smoking, alcohol, or drug use; and those who are identified to be at higher risk are referred to specialty addiction treatment [28,29]. These efforts have had marked success in a number of settings, and screening and brief intervention is now reimbursable under Medicare in some locations. However, one factor limiting the success of SBIRT programs is that identified individuals often fail to follow through on referrals to specialty care [28]. Integration of computer-assisted treatment programs for addiction and mental health problems into primary care settings may be one strategy for fostering stronger links between these systems of care.

As Behavioral Platforms

In most areas of psychiatry, combined treatments encompassing medication and behavioral therapy are seen as the ideal. In many settings, this ideal is prohibitively expensive and difficult to achieve or maintain over the course of treatment, given time constraints on clinicians and logistical issues of patients. Thus, offering computer-assisted therapy to complement pharmacotherapy for depression, anxiety, or addictive disorders may be one means of broadening the benefits of pharmacotherapy for these disorders. Some pharmaceutical companies have already made access to computer-assisted therapy available to patients who are prescribed specific medications for those disorders.

Similarly, the benefits in terms of cost, statistical power, and addressing ethical concerns of offering individuals participating in placebo-controlled trials of pharmacotherapies are now widely acknowledged [30]. However, it remains a challenge, particularly in multisite trials, to train and supervise clinicians to provide the behavioral therapy platform, and to do so at a consistent, standardized level to reduce risk of therapist or site effects. Thus, offering all participants in a clinical pharmacotherapy trial access to an empirically validated, computer-assisted treatment in conjunction with close monitoring and clinical management in the protocol is another key potential role for these approaches.

Prevention of Mild Cases/Introduction to Treatment

Although many psychiatric disorders are treated more effectively before they become severe and intractable, individuals early in the course of a disorder rarely seek formal treatment. Thus, one particularly exciting application of computer-assisted intervention is to offer early—and thus possibly preventive—intervention. A number of Web-based therapies have been evaluated and have demonstrated some promise in early intervention and prevention with general, nonclinical populations, as well as with hard-to-reach populations [31].

What Is the Level of Empiric Support for Computer-assisted Therapies?

Clinical efficacy research on computer-assisted therapy is a new and emerging area; thus, well-controlled, randomized, clinical trials are still rare, and methodologic standards for clinical trials are not yet firmly defined. In general terms, the early efficacy data from many of these approaches are seen as promising [9,26,32–34] but should be interpreted with caution due to multiple methodologic problems that characterize much of the existing literature [4,12,27,35, 36]. Very few of the existing studies meet current methodologic quality standards required for determining that a behavioral therapy is empirically supported [37]. In particular, the most common control conditions used in randomized controlled trials of computer-assisted therapies are wait-list or assessment-only controls [26••], which constitute weak tests of the efficacy of an approach. This problem is further magnified for the many studies in which evaluation of treatment efficacy is based solely on participants' unblinded, subjective self-reports.

A recent review by Postel and colleagues [12] of Internet treatment studies for mental health disorders characterized the methodologic quality of the literature as low: only five of the 14 studies reviewed met minimal criteria for study quality as defined by the Cochrane criteria [12,38]. Consistent weaknesses noted across studies involved monitoring treatment compliance, high levels of attrition, inadequate application of intention-to-treat principles, insufficient attention to issues such as treatment credibility, failure to protect the integrity of independent variable, reliance on unvalidated or subjective self-reports of outcome, and failure to comply with CONSORT (Consolidated Standards of Reporting Trials) principles such as intention-to-treat analyses [39]. Finally, in much of this literature, the nature of the computer-assisted intervention itself is too often an underspecified or poorly defined “black box,” the components or integrity of which are difficult to evaluate or replicate.

Summary of Meta-analytic Systematic Reviews

The few existing meta-analytic studies of computer-assisted therapies have focused on those for depression or anxiety disorders, for which most studies have been done to date. In a meta-analysis of Internet-based CBTs for depression (four trials) and anxiety disorders (seven trials), Spek et al. [40] reported a larger effect size ($d=0.96$) for the interventions targeting anxiety than those targeting depression ($d=0.40$), with significant heterogeneity of effect size in terms of control or comparison group used (with larger effect sizes associated with less stringent comparisons, such as wait-list controls). Effect size also differed with respect to level of therapist involvement, with interventions involving clinician support having a significantly larger effect size than those that did not ($d=1.0$ vs $d=0.26$) [40].

The review by Tumur and colleagues [36] of computerized CBT for obsessive-compulsive disorder found only two randomized clinical trials (of 149 citations), both of which indicated strong support for Behavior Therapy Steps [41], an Internet program for obsessive-compulsive disorders. Although they concluded that there was good evidence from these two studies that patients could benefit from these interventions, they also pointed out that additional research is needed by “independent researchers, rather than those with commercial interests in the intervention” [36]. This highlights another significant limitation of the existing research on computerized therapies, as well as a caution regarding their overly rapid acceptance, as many of the interventions have been developed and evaluated by individuals or entities with a significant financial stake in the outcome. Thus, clinicians considering adopting a computer-assisted therapy should carefully consider the quality of the evidence for its effectiveness in light of methodologic rigor and how potential conflicts of interest were managed by the investigators.

A recent systematic review of computerized CBT for depression by Kaltenthaler and colleagues [4] reported that only four randomized trials met very basic methodologic quality criteria (eg, randomized clinical trial with pre-/post-treatment assessment). Moreover, even these four trials were characterized by variability in using standardized diagnostic criteria for depression, uneven rates of follow-up, and reliance on self-reported depression outcome measures [4,12, 27].

A 2008 review of Web-based interventions for alcohol use problems by Bewick and colleagues [42] found only four randomized controlled trials evaluating outcome of such interventions on alcohol use. These studies involved predominantly undergraduate samples, limiting their generalizability to clinical populations or to the broader range of individuals with alcohol use problems. Although the Web-based interventions were well-received by the users, empiric support was inconsistent but favored combined interventions that included personalized feedback on drinking levels and extra support. As in the depression and anxiety literature, the methodologic quality of this group of studies was also weak in that just one of the 10

randomized trials that they included met more than 75% of the Downs and Black [43] criteria for rating methodologic quality, and only three met more than 50% of the criteria [42].

Similarly, a review by Copeland and Martin [35] on Web-based interventions for all substance use disorders likened the field to a continued “descriptive feast but an evaluative failure” [44]. They further cautioned that “... some prominent drug-related websites have been reported to contain information that is factually incorrect and potentially harmful” [35]. Bock et al. [8] noted that in spite of modest but consistent positive effects, many of the available smoking cessation websites did not provide basic coverage of key components of cessation treatment as recommended in national guidelines; sites also varied in the accuracy of the information presented, reliance on reading of text, and level of interactive features. Recently, however, well-controlled randomized clinical trials evaluating computer-assisted interventions for alcohol use, smoking, and other addictions have begun to appear [19,45–47].

Cautions: Limitations and Risks

In spite of their uneven level of empiric support, there is a great deal of enthusiasm about computer-assisted therapies, and they have been adopted extremely rapidly in some health care systems outside the United States, consistent with the prevailing ethos of the Internet that “everything should be freely and immediately disseminated to anyone.” However, like any potentially effective treatment or novel technology, computer-assisted therapies also carry risks, limitations, and cautions often minimized or overlooked by their proponents, and a pressing need exists for research on their safety and efficacy. Although computer-assisted therapies, like other behavioral therapies, are seen as comparatively low risk and safe [27], the potential for harm exists and has not yet been studied systematically.

For several reasons, we advocate a more cautious, empiric, and balanced approach as US psychiatry enters this brave new world. First, the evidence supporting the efficacy of computer-assisted therapies remains inchoate and equivocal, and the potential for harmful effects is largely unexplored. As reviewed previously, the quality of the interventions themselves is highly variable, and the existing randomized clinical trials are few and often flawed. Many of the trials seen as supporting the efficacy of computer-assisted treatments involve comparisons to weak wait-list control conditions, with extremely high rates of attrition and only short-term outcome measures that are based solely on unverified patient self-reports (essentially demonstrating only that computer-assisted treatment X is perceived by users as “better than nothing”). Furthermore, many of the existing studies, particularly those featuring weaker methodologic standards, have been conducted only by their developers, who have significant financial interest in demonstrating the efficacy of their approaches. The field should soon develop a strong set of methodologic standards, including those for management of conflicts of interests, to avoid the problems that have beset some pharmaceutically sponsored research.

Although they are likely to be rare, there are negative or unintended effects that may be associated with indiscriminate or rash promulgation of computer-assisted therapies. For example, individuals who rely on Web-based intervention alone and have poor outcome may be discouraged or delay in seeking further needed treatment. This is a particular concern in light of the many Web-based studies that have extremely high attrition rates and have failed to reach even a majority of participants for follow-up evaluation. Thus, it is of great importance to study outcomes for those who fail to respond to or who drop out of computer-assisted therapies. It also should be remembered that no system is completely secure, and threats to confidentiality should be seriously considered by providers and patients, particularly for vulnerable populations or those engaged in illicit behavior.

Moreover, for the foreseeable future, computer-assisted therapies should complement and extend, rather than replace, careful clinician monitoring and assessment to ensure that the

appropriate program is accessed by the appropriate patients. There are multiple potential negative effects of patients accessing computer-assisted therapies with inadequate or no clinician oversight, particularly for patients at the extreme ends of the severity spectrum. An addicted patient could cease substance use, detoxify too quickly, and develop complications of withdrawal. Attempts to follow through on suggested techniques may entail risks (eg, suggesting increased contact with children for an estranged parent, or cutting off contacts with people in the social network who are associated with drug use), including unmonitored suicidal or homicidal ideation. Offering the opportunity for peer support through “chat” features for users may have multiple unintended consequences, both positive and negative (eg, for illegal drug users).

Conclusions

Despite their promise, broad implementation of computer-assisted therapies is based on the not-yet-established assumption that the efficacy of these approaches is commensurate with that of more traditional clinician-delivered, empirically validated therapies. More studies are needed that offer direct comparisons of computer-assisted therapies to the original therapist-delivered versions on which they are based, with appropriate control conditions. The tremendous potential of computer-assisted therapies may be diminished if their benefits are overstated or the therapies are broadly released or disseminated before being carefully evaluated using the same systematic steps and methodologic standards that are requirements for evaluating clinician-delivered therapies [37,48]. However, those that are determined to be safe, even if they are modestly effective, can have tremendous impact if delivered to the large number of individuals who may benefit from them.

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References

Papers of particular interest, published recently, have been highlighted as:

• Of importance

•• Of major importance

1. Marks IM, Cavanagh K, Gega L. Hands on Help: Computer-Aided Psychotherapy. Hove: Psychology. 2007 This is a comprehensive review of a wide variety of computer-assisted therapies.
2. Proudfoot J, Goldberg D, Mann A, et al. Computerized, interactive, multimedia cognitive-behavioral program for anxiety and depression in general practice. *Psychol Med* 2003;33:217–227. [PubMed: 12622301]
3. Proudfoot J, Ryden C, Everitt B, et al. Clinical efficacy of computerised cognitive-behavioral therapy for anxiety and depression in primary care: randomised controlled trial. *Br J Psychiatry* 2004;185:46–54. [PubMed: 15231555]
4. Kaltenthaler E, Parry G, Beverley C, Ferriter M. Computerized cognitive-behavioural therapy for depression: systematic review. *Br J Psychiatry* 2008;193:181–184. [PubMed: 18757972]
5. Kaltenthaler E, Sutcliffe P, Parry G, et al. The acceptability to patients of computerized cognitive behaviour therapy for depression: a systematic review. *Psychol Med* 2008;38:1521–1530. [PubMed: 18205964]
6. Marks IM, Cavanagh K, Gega L. Computer-aided psychotherapy: revolution or bubble? *Br J Psychiatry* 2007;191:471–473. [PubMed: 18055948]

7. Elkin I, Parloff MB, Hadley SW, Autry JH. NIMH Treatment of Depression Collaborative Research Program. Background and research plan. *Arch Gen Psychiatry* 1985;42:305–316. [PubMed: 2983631]
8. Bock BC, Graham AL, Whiteley JA, Stoddard JL. A review of web-assisted tobacco interventions (WATIs). *J Med Internet Res* 2008;10:e39. [PubMed: 19000979]
9. Marks IM, Cavanagh K. Computer-aided psychological treatments: evolving issues. *Annu Rev Clin Psychol* 2009;5:121–141. [PubMed: 19327027]
10. Rothbaum BO, Hodges L, Anderson PL, et al. Twelve-month follow-up of virtual reality and standard exposure therapies for the fear of flying. *J Consult Clin Psychol* 2002;70:428–432. [PubMed: 11952201]
11. Rothbaum BO. Using virtual reality to help our patients in the real world. *Depress Anxiety* 2009;26:209–211. [PubMed: 19253416]
12. Postel MG, de Haan HA, DeJong CAJ. E-therapy for mental health problems: a systematic review. *Telemed J E Health* 2008;14:707–714. [PubMed: 18817501]
13. Regier DA, Narrow WE, Rae DS, et al. The de facto US mental health and addictive disorders service system: Epidemiological Catchment Area prospective one-year prevalence rates of disorders and services. *Arch Gen Psychiatry* 1993;50:85–91. [PubMed: 8427558]
14. Dain N. Reflections on antipsychiatry and stigma in the history of American psychiatry. *Hosp Community Psychiatry* 1994;45:1010–1014. [PubMed: 7829037]
15. Turner CF, Ku L, Rogers SM, et al. Adolescent sexual behavior, drug use and violence: increased reporting with computer survey technology. *Science* 1998;280:867–873. [PubMed: 9572724]
16. McCrone P, Knapp M, Proudfoot J, et al. Cost-effectiveness of computerized cognitive-behavioral therapy for anxiety and depression in primary care: randomized controlled trial. *Br J Psychiatry* 2004;185:55–62. [PubMed: 15231556]
17. Cavanagh K, Shapiro DA. Computer treatment for common mental health problems. *J Clin Psychol* 2004;60:239–251. [PubMed: 14981789]
18. Wright JH, Wright AS, Albano AM, et al. Computer-assisted cognitive therapy for depression: maintaining efficacy while reducing therapist time. *Am J Psychiatry* 2005;162:1158–1164. [PubMed: 15930065]
19. Carroll KM, Ball SA, Martino S, et al. Computer-assisted cognitive-behavioral therapy for addiction. A randomized clinical trial of ‘CBT4CBT’. *Am J Psychiatry* 2008;165:881–888. [PubMed: 18450927]
20. Carroll, KM. *A Cognitive-Behavioral Approach: Treating Cocaine Addiction*. Rockville: National Institute on Drug Abuse; 1998.
21. Santa Ana E, Martino S, Ball SA, et al. What is usual about ‘treatment as usual’: audiotaped ratings of standard treatment in the Clinical Trials Network. *J Subst Abuse Treat* 2008;35:369–379. [PubMed: 18337053]
22. Sholomskas D, Syracuse G, Ball SA, et al. We don’t train in vain: a dissemination trial of three strategies for training clinicians in cognitive behavioral therapy. *J Consult Clin Psychol* 2005;73:106–115. [PubMed: 15709837]
23. Carroll KM, Rounsaville BJ. A vision of the next generation of behavioral therapies research in the addictions. *Addiction* 2007;102:850–862. discussion 863–869. [PubMed: 17523974]
24. Anthony JC, Warner LA, Kessler RC. Comparative epidemiology of dependence on tobacco, alcohol, controlled substances and inhalants. Basic findings from the National Comorbidity Study. *Exp Clin Psychopharmacol* 1994;2:244–268.
25. Lawrence D, Mitrou F, Zubrick SR. Smoking and mental illness: results from population surveys in Australia and the United States. *BMC Public Health* 2009;9:285. [PubMed: 19664203]
26. Portnoy DB, Scott-Sheldon LAJ, Johnson BT, Carey MP. Computer-delivered interventions for health promotion and behavioral risk reduction: a meta-analysis of 75 randomized controlled trials, 1988–2007. *Prev Med* 2008;47:3–16. This was an excellent meta-analysis. [PubMed: 18403003]
27. Gibbons, MC.; Wilson, RF.; Samal, L., et al. Impact of consumer health informatics applications, Evidence Report/Technology Assessment No. 188. in Agency for Healthcare Research and Quality. Rockville, MD: Agency for Healthcare Research and Quality; 2009.

28. Babor TF, McKee BG, Kassenbaum PA, et al. Screening, Brief Intervention, and Referral to Treatment (SBIRT): toward a public health approach to the management of substance abuse. *Subst Abuse* 2007;28:7–30.
29. Saitz R, Svikis D, D’Onofrio G, et al. Challenges applying alcohol brief intervention in diverse practice settings: populations, outcomes, and costs. *Alcohol Clin Exp Res* 2006;30:332–338. [PubMed: 16441282]
30. Carroll KM. Manual guided psychosocial treatment. a new virtual requirement for pharmacotherapy trials? *Arch Gen Psychiatry* 1997;54:923–928. [PubMed: 9337772]
31. Postel MG, de Jong CA, de Haan HA. Does e-therapy for problem drinking reach hidden populations? *Am J Psychiatry* 2005;162:2393. [PubMed: 16330613]
32. Titov N. Status of computerized cognitive behavioural therapy for adults. *Aust N Z J Psychiatry* 2007;41:95–114. [PubMed: 17464688]
33. Kaltenthaler E, Parry G, Beverley C. Computerized cognitive behavior therapy: a systematic review. *Behav Cogn Psychother* 2004;32:31–55.
34. Cuijpers P, Marks IM, Van Straten A, et al. Computer-aided psychotherapy for anxiety disorders: a meta-analytic review. *Cogn Behav Ther* 2009;38:66–82. [PubMed: 20183688]
35. Copeland J, Martin G. Web-based interventions for substance use disorders: a qualitative review. *J Subst Abuse Treat* 2004;26:109–116. [PubMed: 15050088]
36. Tumur I, Kaltenthaler E, Ferriter M, et al. Computerized cognitive behavior therapy for obsessive-compulsive disorder: a systematic review. *Psychother Psychosom* 2007;76:196–202. [PubMed: 17570957]
37. Chambless DL, Hollon SD. Defining empirically supported therapies. *J Consult Clin Psychol* 1998;66:7–18. [PubMed: 9489259]
38. Higgins, JPT.; Green, S. The Cochrane Library. Vol. 4. Chichester: Wiley; 2006. Cochrane Handbook for Systematic Reviews of interventions 4.2.6.
39. Altman DG, Schulz KF, Moher D, et al. The revised CONSORT statement for reporting randomized trials: explanation and elaboration. *Ann Intern Med* 2001;134:663–694. [PubMed: 11304107]
40. Spek V, Cuijpers P, Nyklicek I, et al. Internet-based cognitive-behavior therapy for symptoms of depression and anxiety: a meta-analysis. *Psychol Med* 2007;37:319–328. [PubMed: 17112400]
41. Greist JH, Marks IM, Baer L, et al. Behavior therapy for obsessive compulsive disorder guided by computer or by a clinician compared with relaxation as a control. *J Clin Psychiatry* 2002;63:138–145. [PubMed: 11874215]
42. Bewick BM, Trussler K, Barkham M, et al. The effectiveness of web-based interventions designed to decrease alcohol consumption—a systematic review. *Prev Med* 2008;47:17–26. [PubMed: 18302970]
43. Downs SH, Black N. The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *J Epidemiol Community Health* 1998;52:377–384. [PubMed: 9764259]
44. Mitchell E, Sullivan F. A descriptive feast but an evaluative famine: systematic review of published articles on primary care computing during 1980–97. *BMJ* 2001;322:279–282. [PubMed: 11157532]
45. Dallery J, Glenn IM, Raiff BR. An Internet-based abstinence reinforcement treatment for cigarette smoking. *Drug Alcohol Depend* 2007;86:230–238. [PubMed: 16930854]
46. Bickel WK, Marsch LA, Buchhalter AR, Badger GJ. Computerized behavior therapy for opioid-dependent outpatients: a randomized controlled trial. *Exp Clin Psychopharmacol* 2008;16:132–143. [PubMed: 18489017]
47. Strecher VJ, Shiffman S, West R. Randomized controlled trial of a Web-based computer-tailored smoking cessation program as a supplement to nicotine patch therapy. *Addiction* 2005;100:682–688. [PubMed: 15847626]
48. Chambless DL, Ollendick TH. Empirically supported psychological interventions: controversies and evidence. *Annu Rev Psychol* 2001;52:685–716. [PubMed: 11148322]