Using Technology-Based Therapeutic Tools in Behavioral Health Services

Treatment Improvement Protocol (TIP) Series

60

Part 3: A Review of the Literature

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Section 1—A Review of the Literature

Overview

The use of communication technologies (e.g., the Internet, email, video conferencing, telephone) to prevent and/or treat mental and substance use disorders has been recognized by the Center for Substance Abuse Treatment (CSAT) as important in helping meet unaddressed treatment needs (CSAT, 2009a). This review covers the therapeutic use of such technologies, whether they are delivered via telephones or computers, as well as their use in supervising and training program staff members. It is not concerned with most other uses of new technologies (e.g., electronic record keeping, computer modeling, biotechnology, social media). Although technology-assisted care (TAC) provides a number of opportunities to enhance behavioral health services (Eonta et al., 2011), this review focuses on interventions that use technologies as a primary means of delivering services.

As with the rest of this Treatment Improvement Protocol (TIP), the literature review focuses on research involving adults. Because a good deal of the research in this area has been conducted outside the United States, studies involving foreign populations are identified as such; those that are not so identified should be assumed to have taken place in the United States. This review focuses on the past 10 years of research, with occasional references to older, seminal literature. When possible, it uses other reviews to summarize earlier studies. The review generally does not draw conclusions, but instead tries to present several points of view so that readers who are interested in the issue may seek out the appropriate literature and draw their own conclusions. Thus, readers should not accept the presentation of one article's findings as an endorsement of one position over another.

The first two sections after "Overview" provide some of the basic information about the technologies included in this TIP and give some idea about how they are currently being used in behavioral health as well as more general claims about their effectiveness. The larger sections that follow discuss the use of such technologies to address prevention and treatment specifically of mental and substance use disorders and are organized by the disorder addressed. Those sections may include research on one or multiple types of technology, depending on what recent literature is available.

Understanding Technologies

Introduction

The "Understanding Technologies section covers basic technologies that are being used in the treatment and prevention of mental and substance use disorders:

1. Telephone/Audio Counseling
2. Video/Web Conferencing
3. Self-Directed, Web-Based, and Computer-Based Therapeutic Tools
4. Web-Based Text Communication
5. Mobile (Handheld) Technologies

These categories are not exclusive. One intervention may involve components that use any number of these technologies, and there is almost always some overlap with other categories (e.g., mobile technologies typically use phone and/or text communication).

Although the system of categorizing interventions by the technology used is common in the literature, it is not the only way to categorize them, and there are other features of these interventions that can be used to distinguish one from another. For example, interventions can be categorized as either synchronous (involving communications occurring in real time) or asynchronous (occurring outside real time, with some delay between the sending and receiving of the communication; Suler, 2004; Yellowlees et al., 2010). The larger portion of this review discusses interventions according to the disorder or problem targeted by the intervention.

This section introduces these technologies, presents basic findings about their use and effectiveness (drawing on other reviews when available), and also highlights interventions that can be used to address multiple substance use and mental disorders (as opposed to interventions directed at a single disorder or group of disorders, such as anxiety disorders).

Telephone/Audio Counseling

Counseling has been conducted via telephone for quite some time, and many counselors report positive results using that technology (Maheu, Pulier, Wilhelm, McMenamin, & Brown-Connolly, 2004). Potential benefits for clients of telephone-based services, relative to in-person services, include lower expense, greater convenience, greater anonymity, and a greater sense of control (Reese, Conoley, & Brossart, 2002). Telephones, either using live interviewers or automated systems, have been successfully used to screen and assess mental and substance use disorders and cognitive impairment (Kobak, Williams, & Engelhardt, 2008; Marks et al., 1998; Martin-Khan, Wootton, & Gray, 2010; Rohde, Lewinsohn, & Seeley, 1997; Simon, Revicki, & VonKorff, 1993; Tunstall, Prince, & Mann, 1997; Xu et al., 2012). However, some disorders (e.g., adjustment disorder with depressed mood) may be more difficult to assess by phone than in person (Rohde et al., 1997).

Telephones have also been used to improve treatment/medication compliance (Maust et al., 2012), monitor recovery from mental and substance use disorders (Godleski, Cervone, Vogel, & Rooney, 2012), and motivate potential clients to enter treatment (Seal et al., 2012). Adding phone calls to a Web-based intervention may also improve treatment compliance and outcomes (Graham et al., 2011; Titov, Andrews, Choi, Schwenke, & Johnston, 2009). Leach and Christensen (2006), in a literature review on telephone-based interventions for mental and substance use disorders, located 14 studies involving interventions for depression (6 studies), anxiety (3), eating disorders (3), substance use disorders (1), and schizophrenia (1). They concluded that such interventions could reduce symptoms of anxiety and depression as well as disordered eating behaviors. They also found limited and somewhat flawed evidence that such interventions could reduce alcohol use for individuals with alcohol use disorders and hospitalization rates for people with schizophrenia. However, most of the studies they reviewed had methodological problems, such as small sample sizes, high dropout rates, and a lack of randomization, which limited their ability to draw firm conclusions about effectiveness. They also noted that effective telephone-based interventions were highly structured and made use of homework assignments for clients. Another review by Mohr, Vella, Hart, Heckman, and Simon (2008), which included 12 trials of phone-based interventions for depression, also found that

such interventions were associated with significantly greater reductions in depressive symptoms than were control conditions; these interventions were also associated with reductions in symptoms from baseline to posttreatment follow-up that were comparable with those observed in many in-person interventions.

Other studies have found telephone-based interventions to be more effective than no-treatment controls and/or about as effective as some standard treatments for smoking cessation (Cummins, Bailey, Campbell, Koon-Kirby, & Zhu, 2007; Rabius, McAlister, Geiger, Huang, & Todd, 2004; Regan, Reyen, Lockhart, Richards, & Rigotti, 2011), continuing care for substance use disorders (Farabee et al., 2012; McKay, Lynch, Shepard, & Pettinati, 2005; McKay et al., 2011; Stout, Rubin, Zwick, Zywiak, & Bellino, 1999), depression (Mohr, Carmody, Erickson, Jin, & Leader, 2011; Mohr et al., 2012; Mohr et al., 2008; Piette et al., 2011), obsessive–compulsive disorder (OCD; Kenwright, Marks, Graham, Franses, & Mataix-Cols, 2005; Lovell, Fullalove, Garvey, & Brooker, 2000), problem gambling (Rodda & Lubman, 2012), posttraumatic stress disorder (PTSD) symptoms (DuHamel et al., 2010), and the promotion of positive behavior change related to healthy eating and exercise (Eakin, Lawler, Vandelanotte, & Owen, 2007). Self-guided treatment, using phone calls from counselors, has also been found to be effective for anxiety disorders (Cuijpers, Donker, van Straten, Li, & Andersson, 2010). Also, telephone-based cognitive–behavioral therapy (CBT) can improve health outcomes for people with physical disorders (Muller & Yardley, 2011).

Dorstyn, Mathias, and Denson (2011) conducted a meta-analytic review of telephone-based counseling interventions for people with acquired physical disabilities (e.g., spinal cord injuries, severe burns) but not, for the most part, people with mental or substance use disorders; they found that such interventions were associated with significant improvements in the use of coping skills, in community integration, and in symptoms of depression immediately following telephone counseling as well as more modest, but lasting, improvements in quality of life.

Telephone helplines, or hotlines set up so that individuals in need of services can call into a centralized location and speak with a counselor, have also been effective in suicide prevention (Gould, Kalafat, Harris Munfakh, & Kleinman, 2007), tobacco cessation (Cummins et al., 2007; Stead, Perera, & Lancaster, 2007), and addressing general mental health concerns, including panic attacks (Burgess, Christensen, Leach, Farrer, & Griffiths, 2008). In their interviews with therapists, Day and Schneider (2000) found that some counselors felt that treatment using audio only caused them to miss important information (e.g., body language, client's physical state), but other counselors observed that a lack of the visual element increased the ease of communication between client and therapist. Clients who had tried telephone-based services generally expressed satisfaction with them and found those services helpful for a variety of behavioral health problems (Reese et al., 2002; Reese, Conoley, & Brossart, 2006). Many clients also expressed a preference for telephone counseling. In one survey of clients who had received both telephone-based and in-person counseling, 96 percent stated they would be willing to seek telephone-based services again; by comparison, only 63 percent said they would be willing to use in-person services again (Reese et al., 2006).

Video/Web Conferencing

Video services for behavioral health are typically provided through video conferencing using computers connected to the Internet (Zack, 2004), but they can also be transmitted using

videophones connected to phone lines, although that is a lower-quality option (Godleski, Nieves, Darkins, & Lehmann, 2008). Video conferencing, which provides both audio and video, has been used in a variety of behavioral health settings, usually to provide what would otherwise be an in-person service to clients who are not able to reach the provider's location. A comprehensive review of these services (entitled *Evidence-Based Practice for Telemental Health*) is available from the American Telemedicine Association (ATA; 2009). The review is focused on interactive video conferencing because reviewers found that this technology had the largest research base in support of its use of any of the technologies they considered.

Backhaus et al. (2012) reviewed 65 studies involving the use of video conferencing specifically for the provision of psychotherapy. They concluded that:

- This was a feasible approach to providing therapy.
- Therapists were able to develop a therapeutic alliance using this technology (although that might be limited to one-on-one therapy, as studies involving group and family therapy found some problems in this area).
- Most users were satisfied with this method of delivery and reported a level of satisfaction comparable with that reported by clients receiving in-person therapy, and the major sources of dissatisfaction were technical difficulties.
- Clients using video conferencing had similar levels of retention and showed similar levels of clinical improvement to those receiving in-person treatments, with some differences depending on the specific disorder being treated (e.g., adolescents being treated for depression had faster improvements when treated via video conferencing).

García-Lizana and Muñoz-Mayorga (2010b) conducted a review of randomized controlled trials of video conferencing interventions for mental illness, of which they found 10. Although they found the research insufficient to draw a strong conclusion, the data that were available indicated that this approach was about as effective as in-person services and was an appropriate option, especially with clients who had difficulties accessing in-person services.

Richardson, Frueh, Grubaugh, Egede, and Elhai (2009) also reviewed literature on the use of video conferencing for behavioral health. They summarized earlier literature, as presented in older literature reviews, which consisted mainly of case studies, program descriptions, and anecdotal support for the use of video conferencing technology. Taken together, the literature does provide strong support for the acceptability to clients of such services and the reliability of assessments conducted using such technology. In the literature published since 2003, they found further support for those claims, and some studies that indicated that video conferencing interventions were superior to no treatment or a reduced level of in-person services. They also reviewed three studies that compared video conferencing interventions with in-person treatment and did not find any significant differences in outcomes for participants in the two groups, with both groups experiencing improvements. These three studies involved relatively brief interventions, and the authors of the largest of them (O'Reilly et al., 2007) questioned the extent to which their results were generalizable to more complex treatments that may rely more on a therapeutic alliance. The authors also observed a number of methodological problems with many of the studies of video conferencing interventions and noted that many counselors remain wary of trying such interventions in spite of research suggesting their effectiveness. These reviewers also found that research generally indicated that video conferencing was cost-effective relative to

in-person treatment, especially when costs related to travel and expenses for counselors were taken into account.

Norman (2006) reviewed 72 articles concerning video conferencing, with a focus on how well this technology might be adapted in the United Kingdom, and concluded that it appeared to be an effective way to deliver counseling services and was promising for clients living in rural areas. The author also concluded that although some early research did not find video conferencing to be cost-effective, most studies did find it to be so, and current developments in technology were likely to increase its cost-effectiveness. More recent data from the U.S. Department of Veterans Affairs (VA) confirmed that video conferencing interventions can aid healthcare systems in cutting overall costs. An evaluation of telemental health services (i.e., behavioral health services conducted using video conferencing) provided by VA to 98,609 clients between 2006 and 2010 found that hospital admissions for those clients decreased on average by 24.2 percent, and days hospitalized decreased by 26.6 percent (Godleski, Darkins, & Peters, 2012). VA emphasizes that the value derived from implementing telehealth technologies is based on the enhancements such technologies bring to disease management, care/case management, health informatics, and the ability to offer the correct care in the correct place at the correct time. Over the past 5 years, the veteran's home has grown in importance as the "correct place" for the delivery of VA telemental health services, and home telehealth is now a major component of VA telemental healthcare and an ongoing topic of research (Godleski et al., 2008).

How VA Defines Telehealth
"The wider application of care and case management principles to the delivery of healthcare services using health informatics, disease management and telehealth technologies to facilitate access to care and improve the health of designated individuals and populations with the intent of providing the right care in the right place at the right time."
Source: http://www.telehealth.va.gov/about/index.asp

However, some reviewers have drawn less promising conclusions about video conferencing approaches to behavioral health and have found methodological problems with the literature supporting its use (Hailey, Roine, & Ohinmaa, 2008; Simpson, 2009). For example, Hailey et al. (2008) found that although there is evidence supporting the use of video conferencing for a number of mental and substance use disorders, the quality of evidence is stronger for the use of Web- and phone-based interventions. They also observed methodological problems with much of the research involving video conferencing. A review by Simpson (2009) focused on the use of video conferencing to conduct psychotherapy and also observed a lack of rigor in most of the research. More recently, Kramer et al. (2012) discussed some of the methodological problems with the current research involving video conferencing and discussed ways that research could be improved by using a standard evaluation model.

Factors such as bandwidth, image resolution, and display size may affect clients' and counselors' experiences with video conferencing (ATA, 2009). There is some research indicating that at least one of these factors (i.e., bandwidth) can affect outcomes (Hyler, Gangure, & Batchelder, 2005). Other research indicates that certain aspects of assessment (e.g., assessing negative symptoms of

psychosis) may be more accurate when done with higher-bandwidth connections, and clients are more likely to accept and express satisfaction with video conferencing when they use higher-bandwidth connections (Sharp, Kobak, & Osman, 2011). Maheu et al. (2004) discussed in greater detail these and other important technical aspects of video conferencing in relation to behavioral health services.

Some counselors are using publicly available video conferencing software such as Skype, rather than professional video conferencing software, to communicate with clients. However, a recent review of the use of Skype for behavioral health services was able to find only small, poorly designed studies and was thus unable to draw conclusions about its use (Armfield, Gray, & Smith, 2012). In addition, Skype may not be compliant with the Health Insurance Portability and Accountability Act, although some have argued that it can be if counselors set up the service appropriately (see the National Association of Social Workers' review papers on the subject by Morgan & Polowy, 2011, 2012). Morgan and Polowy (2011) concluded that it can be difficult to protect and ensure the confidentiality of clients' communications over Skype. A variety of professional programs are available for counselors to conduct this type of therapy, and such programs may be more appropriate. The independent Web site http://www.telementalhealthcomparisons.com provides information on a variety of these programs and allows for comparisons among them. Although it is used primarily for individual therapy (Simpson, 2009), video conferencing technology has been used to provide other types of treatment, including group and marriage/family therapy (ATA, 2009). As noted, video conferencing has been shown in a number of studies to be an effective technology for conducting clinical interviews and other assessments (ATA, 2009; Richardson et al., 2009).

Video conferencing may be particularly valuable for clients living in rural or remote areas (Grady & Singleton, 2011; LaMendola, 2000; Norman, 2006) and other clients who would not otherwise be able to find counselors with the appropriate skill sets in their areas, such as refugees or members of cultural groups who do not have a strong local presence (Mucic, 2010). Specific populations that have had success using this type of technology include rural residents of nursing homes (Rabinowitz et al., 2010), American Indian veterans (Shore et al., 2012), and people who are incarcerated (Magaletta, Fagan, & Peyrot, 2000). Video conferencing has also been used to assess psychiatric emergency patients in Finland (Sorvaniemi, Ojanen, & Santamäki, 2005) and for involuntary commitment hearings (Price & Sapci, 2007). As noted, video conferencing interventions are typically well-received by clients, and there is also some evidence that clients may participate more in counseling sessions if video conferencing is offered as a treatment option or in addition to in-person sessions (Day & Schneider, 2002). Some research also indicates that some clients may feel more comfortable revealing information via video conferencing than in person (Yuen, Goetter, Herbert, & Forman, 2012).

Despite the fact that some therapists have been reluctant to use video conferencing for treatment because of concerns about building a therapeutic relationship with clients (Day & Schneider, 2000), those who regularly use it have stated that they find it possible to develop a strong therapeutic relationship. This has been confirmed in the few studies that have been conducted in this area (Simpson & Morrow, 2010). For example, in a Canadian study, Germain, Marchand, Bouchard, Guay, and Drouin (2010) found that ratings of the strength of therapeutic alliances for clients with PTSD did not differ significantly between clients treated via video conferencing and those treated in person.

In discussions with therapists who were asked to compare in-person, video, and audio sessions, some therapists complained about being more distant from their clients when using video conferencing, but others observed that this technology made it easier for some clients to self-disclose (Day & Schneider, 2000). Most therapists did believe that a strong therapeutic relationship could be developed in this medium, and some observed that the alliances they developed were even stronger than they might have been if the therapy had been conducted in person. Another potential concern with video conferencing is whether or not interventions developed for delivery in person can be adapted to this medium. Although research is limited, Morland et al. (2011) found that compliance with a manualized behavioral health services intervention did not differ significantly whether the intervention was delivered using video conferencing or in person.

Patient-rated alliance is also a significant factor to consider, and although some studies have found patient-rated alliance to be a positive predictor of favorable outcomes, the complex combinations of patient ratings, therapist ratings, and particular conditions can yield results that are challenging to interpret (Huppert et al., 2014).

Self-Directed, Web-Based, and Computer-Based Therapeutic Tools

Computerized interventions for mental and substance use disorders have been in use for decades (Carr, Ghosh, & Marks, 1988; Selmi, Klein, Greist, Sorrell, & Erdman, 1990), as has Web-based counseling using computers (see historical review by Grohol, 2004). Currently, such interventions are typically delivered via the Internet, and a number of them are entirely or largely mutual-help/self-directed interventions with little or no counselor involvement. Web-based interventions may be purely text-based or may make use of audio and/or video content. However, text-based interventions are discussed in a separate section of this literature review. Barak, Klein, and Proudfoot (2009) separated interventions/programs into four basic categories:

1. Web-based intervention
2. Online counseling and therapy
3. Internet-operated therapeutic software
4. Other online activities

Although these categories may be helpful in better understanding the differences in types of services offered, they are still not widely accepted, and many interventions make use of components from more than one of these categories. Most Internet-based interventions serve individuals, but group therapy (Bellafiore, Colon, & Rosenberg, 2004; Golkaramnay, Bauer, Haug, Wolf, & Kordy, 2007; Roth, 2005) and family or family-oriented therapy (Alemi, Haack, Dill, and Harge, 2005; Bischoff, 2004; Dausch, Miklowitz, Nagamoto, Adler, & Shore, 2009; Jencius & Sager, 2001) may also be conducted over the Internet. Behavioral health programs can also make use of social media sites (Chou, Hunt, Beckjord, Moser, & Hesse, 2009), virtual communities (Enos, 2008; Gorini, Fasano, Gaggioli, Vigna, & Riva, 2008), and even computer games (Wilkinson, Ang, & Goh, 2008) to aid in treatment and recovery.

Computers, whether they make use of the Internet or not, can be used effectively for psychoeducation, and they appear to be at least as effective as printed materials according to studies conducted in the United States, Finland, and Australia (Finkelstein, Lapshin, & Cha, 2008; Pitkänen et al., 2012; Proudfoot et al., 2007; Välimäki, Hätönen, Lahti, Kuosmanen, & Adams, 2012). Psychoeducation can be delivered by computer in such a way that clients can be

exposed to material at their own pace or in the formats that are most appropriate for their individual learning styles (Newman, Koif, Przeworski, & Llera, 2010). Online interventions can also be used to improve specific areas of functioning for people with mental illness. For example, van der Zanden, Speetjens, Arntz, and Onrust (2010) reported on an online course in the Netherlands to teach parenting skills to parents with mental illness. Although the dropout rate in the pilot study was high (only 58 percent completed the posttreatment assessment), those who did complete the intervention had significant improvements in parenting skills and parental competence.

A number of research reviews have found that computerized interventions can be effective at treating a variety of mental and substance use disorders with a greater level of effectiveness than no-treatment controls and, in a number of cases, a level of effectiveness comparable with in-person treatments (Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010; Barak, Hen, Boniel-Nissim, & Shapira, 2008; Chen et al., 2012; Cuijpers et al., 2009; Green & Iverson, 2009; Kaltenthaler et al., 2006; Kiluk et al., 2011; Moore, Fazzino, Garnet, Cutter, & Barry, 2011). Web-based interventions have also been found to be effective at changing such behaviors as those related to diet, exercise, and risky sexual activity (Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004).

Barak et al. (2008) conducted a meta-analytic review of 64 studies involving interventions that addressed a variety of behavioral health concerns and found Web-based interventions to be about as effective as those delivered in person. Of the interventions included in that meta-analysis, those using CBT appeared to be the most effective compared with those using psychoeducational or purely behavioral approaches. The authors also found that there was a significantly greater effect size for interventions that were delivered individually compared with a group therapy format and that interventions appeared to be more effective for clients ages 19 to 39 compared with those who were 40 or older. Web sites that were interactive also appeared to be more effective than those where users passively received information and/or instructions. However, a later review by Hanley and Reynolds (2009), which focused on text-based online therapy only (see discussion later in this section), cautioned that Barak and colleagues' (2008) conclusions on the greater effectiveness of CBT interventions delivered online reflected a more general bias in research toward more technical and less relational interventions (as the former are easier to research).

Similarly, a review of computerized CBT interventions by Green and Iverson (2009) found good evidence to support the use of such interventions for anxiety disorders, depressive disorders, eating disorders, smoking cessation, and problem drinking. The authors also noted that although data are limited, the available research indicates that these interventions will perform as well in community settings as they do in research trials. Another review by Kiluk et al. (2011) of 75 randomized controlled trials that focused on the methodological soundness of computer-assisted interventions for mental and substance use disorders found some evidence that interventions delivered via computer can be effective. The authors found that computer-assisted interventions were more effective than waitlist controls in 88 percent of the studies, more effective than placebo conditions in 65 percent of the studies, and more effective than active control conditions in 48 percent of the studies. The authors did not find any significant differences in effectiveness across four different categories of target problems (depression, anxiety, nicotine dependence, and substance use disorders). Studies that used worse methodologies were significantly more likely

to find computerized interventions more effective than control conditions than studies that used better methodologies.

A major problem involved in comparing Web-based interventions with one another and with other types of interventions is that research quality varies considerably among studies, and most studies have methodological problems (Cunningham & Van Mierlo, 2009; Kiluk et al., 2011). In Kiluk and colleagues' (2011) review, each of the 75 studies was rated according to how well it met 14 different criteria of methodological soundness. None of the studies met the minimum standard for all of the criteria, only three met 13 of the criteria, and the mean quality score was 13.6 (out of a possible 28).

Most recent research does indicate that Web-based interventions have significantly lower costs than do traditional treatments, thus making them more likely to be cost-effective (Hedman et al., 2011; Mitchell, Stanimirovic, Klein, & Vella-Brodrick, 2009). Tate, Finkelstein, Khavjou, and Gustafson (2009) reviewed eight studies of Web-based interventions that provided data on cost savings and concluded that such interventions are more cost-effective than traditional services. These authors also discussed some of the specific cost considerations involved in the development and use of Web-based behavioral health services. An earlier review by Palmqvist, Carlbring, and Andersson (2007), based on fewer studies, also found that such interventions promised to be more cost-effective. Both reviews, however, included a number of studies from outside the United States, where different approaches to healthcare might affect costs, as well as studies that did not include all startup costs.

For most mental and substance use disorders, some therapist contact is optimal, but Web- and computer-based treatments can reduce the amount of time a therapist needs to provide care and reach clients who might not otherwise seek or be able to access care (Andersson, 2009; Andrews, Davies, & Titov, 2011; Kiropoulos et al., 2008). Research has consistently found that Web-based treatment is less labor intensive for staff members, and many studies have found relatively low time requirements for the staff members involved in service delivery (Andrews et al., 2011; Kiropoulos et al., 2008; Marks, Kenwright, McDonough, Whittaker, & Mataix-Cols, 2004).

Web-based interventions can be either guided or unguided. In guided interventions, a therapist or other staff member communicates with the client to assist him or her in using the online intervention (e.g., by explaining homework assignments, giving feedback about progress, reminding clients to complete certain tasks), whereas in an unguided intervention, the client only interacts with the software or other self-guided materials (e.g., automated emails, published literature; Furmark et al., 2009; Watkins, Smith, Kerber, Kuebler, & Himle, 2011). Some interventions have found better results when even a minimal amount of contact in the form of simple reminders was added to an online treatment (e.g., Clarke et al., 2005; Moritz, Schilling, Hauschildt, Schröder, & Treszl, 2012). Interventions vary as to the type and amount of guidance provided by staff members (as well as the type of staff member providing that guidance), and those factors are likely to be important in determining whether a guided intervention will be more effective than an unguided one. In their review of Web-based therapeutic interventions, Palmqvist and colleagues (2007) concluded that greater therapist involvement is associated with larger effect sizes. However, other studies involving treatments for social anxiety disorder (SAD; Furmark et al., 2009; Berger, Caspar et al., 2011) and depression (Berger, Hämmerli, Gubser, Andersson, & Caspar, 2011; Farrer, Christensen, Griffiths, & Mackinnon, 2011) have not found

any significant difference in outcomes between interventions that were guided and those that were unguided.

The effect of therapist contact may also vary according to the type and frequency of contact. Klein and colleagues (2009) did not find any significant differences in outcomes for people receiving a Web-based treatment for panic disorder when they received three emails a week from their therapist instead of one email. However, an evaluation of an online program to facilitate recovery from bipolar disorder found that adding email communications from a peer coach did significantly improve initial and long-term use of the program (Simon, Ludman, et al., 2011). In a large (N=2,005) trial of a Web-based smoking cessation intervention, the addition of proactive phone calls from counselors to an interactive intervention was associated with significantly better long-term abstinence rates than were found with users of either a static or an interactive intervention alone (Graham et al., 2011). Also, European research on individual differences among therapists relating to outcomes in Web-delivered CBT interventions for people with major depressive disorder failed to find any relationship between such factors and changes in depressive or anxiety symptoms (Almlöv, Carlbring, Berger, Cuijpers, & Andersson, 2009). From this small study, the authors concluded that these therapist factors likely play less of a role in Web-delivered interventions than they do in ones delivered in person.

Internet technology has been used to deliver prevention, screening and assessment, early intervention, acute care, and recovery support services for a wide variety of behavioral health problems. Although most studies focus on one particular type of behavioral health intervention, Webb, Joseph, Yardley, and Michie (2010) conducted a meta-analytic review of 85 Web-based behavioral health interventions that sought to effect a specific behavioral change (e.g., increase physical activity, decrease alcohol use, promote smoking cessation). They evaluated three different sets of intervention characteristics: the use of theory in designing the intervention, the use of specific behavioral change techniques, and the mode of delivery.

Greater use of theory in developing interventions was associated with a greater effect size for interventions; the biggest effect size was for the use of theory or target constructs as predictors of behavior to select recipients for the intervention. Only three theories were used by enough studies to be evaluated; those theories were, in order of greatest to smallest effect size: theory of reasoned action/planned behavior, the transtheoretical model of readiness for change, and social–cognitive theory.

Brouwer et al. (2011) reviewed literature on effective program characteristics of Web-based lifestyle promotion interventions, which included smoking cessation and drinking reduction, as well as interventions targeting diet and exercise. They found that having email and/or phone contact with users and providing regular updates concerning Web site content were both associated with a greater number of logins to the site, whereas providing peer and/or counselor support was associated with increased time spent using the site. Research regarding the preferred methods for Web site design for behavioral health programs/interventions is limited, but Danaher, McKay, and Seeley (2005) discussed different possibilities for design (i.e., the matrix, tunnel, hierarchical, and hybrid models) and how each model may be best used for certain behavioral change goals. In a European survey of experts on different aspects of Web-based healthcare and related topics (e.g., e-commerce, Web site development, Web design), the majority of respondents believed that potential clients would initially be most motivated to use

such Web sites if they saw them as personally relevant; would be most likely to extend the time spent using a site if they received tailored feedback, found the information provided to be reliable and relevant, and were able to navigate the site without much difficulty; and would be more likely to return to the site if they expected to see new content and were given the opportunity to monitor their own progress toward behavioral health goals (Brouwer et al., 2008).

Rotondi et al. (2012) evaluated the effectiveness of different Web site design elements for clients with co-occurring substance use disorders and serious mental illness. They varied 12 different design factors and found large differences in users' abilities to complete tasks on the site according to the elements used. Users were more likely to complete online tasks successfully on sites that had a shallow hierarchy (i.e., fewer pages to navigate), fewer hyperlinks per page, fewer topic areas, fewer words per page, no graphics, and no tool bars.

Web-based and computerized interventions appear to be a better option for clients with less severe mental illness than for those with more severe mental illness. In an Australian study, Sunderland, Wong, Hilvert-Bruce, and Andrews (2012) analyzed data from clients who completed online CBT treatments for either depression (n=302) or generalized anxiety disorder (GAD; n=361) to evaluate factors associated with treatment response. They found that these treatments were effective for the majority (75 to 80 percent) of clients, but individuals who did not respond to treatment had significantly higher levels of symptom severity and psychological distress prior to treatment than did those who did respond. However, in spite of the promise Web-delivered programs and interventions hold (especially for certain populations), there are a number of difficulties involved in developing and implementing such interventions (Cunningham & Van Mierlo, 2009; Kiluk et al., 2011). There can be other problems involved in the development of such interventions (Cunningham & Van Mierlo, 2009; Danaher et al., 2005) as well:

- There can be difficulties in adapting existing interventions to this method of delivery.
- People may respond differently in front of a computer than they do to another person.
- Greater distractions may exist for someone using the Internet than in a one-on-one setting.

Some counselors have observed that developing a therapeutic alliance may be difficult with online interventions, given the impersonal nature of computer-based interactions (Callan & Wright, 2010). However, Hanley and Reynolds (2009) reviewed five studies that provided data on 161 clients who received online therapy, four of the five of which made comparisons between in-person and Web-delivered therapies. Overall, participants in those studies receiving Web-based services perceived their relationship with the counselor delivering those services to be moderate or high in strength (in most cases, measured with the Working Alliance Inventory, and in one case, with the Agnew Relationship Measure). The authors concluded, based on these data and clinical evidence from other sources, that a good-quality relationship can be developed between counselors and clients working online and that such relationships have the strength necessary to produce therapeutic change. A more recent review by Sucala et al. (2012), which included 11 articles relating to a variety of different types of online therapies, also found that evidence appeared to indicate that clients and counselors could develop a strong therapeutic alliance online, although the evidence was not conclusive.

Kang and Gratch (2011) found that clients working with virtual counselors online expressed a preference for counselors who self-disclosed a high level of intimate information about

themselves (as opposed to those who disclosed a medium or low level of personal information). Some participants (i.e., those who did not consistently engage in either a high or low level of self-disclosure) also revealed more information about themselves to virtual counselors who self-disclosed high levels of personal information.

One of the potential benefits of Web-based interventions over self-guided interventions that relay information on paper is that the former can tailor the information to the specific needs of the client, and many of the Web-based interventions discussed later in this section provide some sort of tailored content. To describe different mechanisms and types of tailoring, Lustria, Cortese, Noar, and Glueckauf (2009) reviewed 30 Web-based interventions that provide tailored content. Web-based interventions can also make use of multiple media, potentially increasing the impact of interventions and improving clients' ability to learn from presented materials (Villani & Riva, 2012).

Ritterband, Thorndike, Cox, Kovatchev, and Gonder-Frederick (2009) proposed a behavioral change model for Web-delivered interventions that may be of help in understanding how Web-delivered services effect client change. Their model involves a nine-step process in which (1) the user of a Web-based intervention is (2) influenced by environmental factors (e.g., ease of access to the Internet, opinions of family/friends) that then affect (3) the user's use of the Web site and compliance with treatment, while that use is also affected by (4) support (e.g., email reminders from staff people) and (5) Web site characteristics, such as methods of engaging users and presenting content. The use of the Web site subsequently leads to (6) behavior change and then (7) symptom improvement occurring through (8) mechanisms of change (e.g., motivation, attitudes, beliefs, self-efficacy, self-monitoring). These improvements in symptoms are sustained through (9) treatment maintenance activities.

One development in computer technology that has received a good deal of attention in behavioral health is the use of virtual reality (VR) software. Different reviews have found that VR exposure therapy (VRET) can effectively treat PTSD (Gerardi, Cukor, Difede, Rizzo, & Rothbaum, 2010; McLean, Steenkamp, Levy, & Litz, 2010) and at least some specific phobias (Gerardi et al., 2010; Newman, Szkodny, Llera, & Przeworski, 2011a; see also the "Use in Treatment of Anxiety Disorders" section). Meyerbröker and Emmelkamp (2010) reviewed only controlled studies of VRET and concluded that, for fear of heights or flying, there was good evidence of its effectiveness, although they also observed that only limited research indicated that VRET may also be effective for panic disorder, seasonal affective disorder, and PTSD. See Part 1, Chapter 1 of this TIP for more on VR/VRET.

In addition to its use in exposure therapy, VR technology has potential uses in clinical role-playing, efficacy-building exercises, and skills training and practice (Botella et al., 2004). This technology has also been used to treat a range of other behavioral health problems, including eating disorders (Ferrer-García & Gutiérrez-Maldonado, 2012), male sexual dysfunction (Optale et al., 2004), nicotine dependence (Moon & Lee, 2009), alcohol use disorders (Lee, Kwon, Choi, Yang, 2007), and other health problems that have a behavioral component, such as obesity and diabetes (Morie & Chance, 2011). See Part 1, Chapter 1 of this TIP for more on other uses of VR.

Alcañiz, Lozano, and Rey (2004) explained some of the technical aspects of VR as it is used in medical and behavioral health settings, with particular attention to the hardware required to set

up a VR environment. The cost and potential difficulties involved in developing virtual environments (i.e., three-dimensional simulations of real or imagined scenarios) have been factors that limit the use of VR technology. Riva and colleagues (2007) reported on the development of an open-source VR platform that enables providers to design and deliver new VR environments according to their clients' specific needs. Virtual worlds can also be used to assist in behavioral health. Morie (2009) described a U.S. Army program that uses the Second Life virtual world to help personnel returning from deployment socialize and learn about available behavioral health resources. The U.S. Department of Defense (DoD) has also created a virtual clinic to provide treatment for PTSD within the Second Life environment (Yellowlees, Holloway, & Parish, 2012).

As an alternative to the time and expense of VR, Bledsoe and Simmerok (2014) offered what they called "augmented reality." Although it was designed to be used via the Internet for distance learning or other educational programs, rather than for therapeutic purposes, their augmented reality amounts to a rich multimedia platform constructed with low- or no-cost, readily accessible ways to make any online experience more engaging. For example, the authors took a picture of their college counseling center, made their Web site look like the picture, and added elements to the picture, along with videos and audio clips that were all designed to be related to the information and to be used as materials in the delivery of their educational course. Such augmented reality could also make Web sites for therapeutic interventions more engaging and effective without incurring the effort and expenses required to produce a VR capability.

Web-Based Text Communication

Text-based communications include a variety of technologies (e.g., text messaging, email, Internet chat rooms) that allow for simple written communication between providers and clients or, in the case of mutual-help groups and activities, among clients. For the most part, these communications support activities occurring elsewhere in person, by computer, or using video/audio communication technology (Maheu et al., 2004). Counselors can use email to conduct therapy or as an adjunct to in-person therapy (Recupero & Harms, 2010), or they can use an online chat program or instant messaging for the same purposes (Derrig-Palumbo, 2010). Although research on evidence-based behavioral health interventions using social media is not available yet, online social networks also show promise as platforms for text-based behavioral health interventions (Levine et al., 2011).

Not much research has evaluated Web-based text communications in behavioral health services, especially as stand-alone interventions. Atherton, Sawmynaden, Sheikh, Majeed, and Car (2012) reviewed the literature on the use of email for clinical communication in a variety of healthcare settings and found nine controlled trials, but most were related to communication in nonbehavioral health settings. They were also unable to draw conclusions about the effectiveness of such communications because of the poor quality of the research. A single study that compared telephone and email contact did find the former to be more effective, but it also had significant methodological problems. An earlier review of text-based online therapy by Hanley and Reynolds (2009) concluded that despite very limited evidence, such interventions showed a great deal of promise.

There is some doubt about the strength of therapeutic alliances built through text-based therapy, as not much research on the subject has been conducted. However, a study by Reynolds, Stiles,

and Grohol (2006) found that clients receiving email therapy rated the impact of their sessions and the strength of their therapeutic alliances about as highly as clients receiving in-person counseling. A review by Hanley and Reynolds (2009), which included five studies of therapeutic alliances in text-based therapies, also found that therapeutic alliances developed in this medium were about as strong as those developed through in-person therapy. However, one of the studies cited in those reviews did find that therapeutic alliances tended to be rated stronger when Internet chat was used than when email was used for text communication (Cook & Doyle, 2002).

Specific studies have found that text-based interventions can be effective in the treatment of eating disorders (Robinson & Serfaty, 2008), depression (Vernmark et al., 2010), smoking cessation (Polosa et al., 2009; Te Poel, Bolman, Reubsaet, & de Vries, 2009), and alcohol use disorders (Blankers, Koeter, & Schippers, 2011); they can likewise be effective for people with schizophrenia and their families/support systems (Rotondi et al., 2010). Text-based interventions that use email and/or chat room discussions have also been effective in promoting weight loss, and Tate (2011) discussed how this research can inform similar interventions in substance use disorder treatment. A German study involving 114 individuals who had completed inpatient treatment for a mental disorder and participated in text-based continuing care groups and 114 matched controls who did not use text-based continuing care found that participants in the text-based groups had a significantly lower risk for negative outcomes (according to a composite measure of behavioral and physical health) than did those in the control group (Golkaramnay et al., 2007). Participants in the chat groups were also more likely (77 percent), but not significantly so, to maintain improvements made during treatment than were those in the control group (65.2 percent). The intervention also had a relatively low dropout rate and a high level of attendance.

Text components are often part of larger interventions. For example, researchers evaluating an online recovery support intervention for people with bipolar disorder found that the addition of an email communication component significantly increased the odds that a participant would return to the Web site and would use it for a longer period of time (Simon, Ralston, et al., 2011). However, an evaluation of a Web-based smoking cessation intervention found that although the addition of an online discussion group increased use of the site, increased use did not translate into significantly better outcomes (Stoddard, Augustson, & Moser, 2008). Text and numerical data, transmitted via computer or over telephone lines, can also be used for symptom monitoring and/or ongoing assessment (Godleski et al., 2012).

Although research evaluating the effectiveness of online text-based peer discussion groups is limited, these groups also appear to be valuable as sources of information and support for individuals with a variety of mental and substance use disorders, including eating disorders (Eichhorn, 2008; Fernández-Aranda et al., 2009), depression (Griffiths, Calear, Banfield, & Tam, 2009; Houston, Cooper, & Ford, 2002, Melling & Houguet-Pincham, 2011), psychosomatic disorders (Haug, Sedway, & Kordy, 2008), and substance use disorders (Hall & Tidwell, 2003). In addition, a number of the interventions discussed in the "Promise of Technology for Specific Populations" section also include a group chat or bulletin board for more informal group discussions and peer support (An, Klatt, et al., 2008; Stoddard et al., 2008; Titov, Andrews, Schwencke, et al., 2009). For more information on Web-based peer support, see the "Peer Support/Mutual-Help Groups" section.

Support groups with a professional facilitator may benefit clients more than those with peer moderators (Barak, Boneh, & Doley-Cohen, 2010). Also, research suggests that, for some clients (e.g., those with serious mental illness), unmoderated support discussion groups can actually have a detrimental effect (Kaplan, Salzer, Solomon, Brusilovskiy, & Cousounis, 2011). Suler (2004) and Anthony (2004) discussed the psychology of text-based interactions, with particular attention to how they affect therapeutic relationships. Alemi et al. (2007) described their own practice using email communication to support substance use disorder treatment services and used their experiences to write some guidelines for others who wish to incorporate email into existing treatment programs.

Mobile (Handheld) Technologies

Mobile technologies include a variety of handheld and mobile devices for communicating information. Currently, the term is most often used to refer to mobile phones—both smartphones (handheld computers that can run software like a computer) and feature phones (which are used only to communicate via audio and sometimes text). The use of mobile devices is now very widespread; many people can access Internet and/or phone service only through such devices (International Telecommunication Union, 2012). For certain populations (e.g., people who are homeless), mobile devices may be the only reliable method clients have for receiving phone and/or Internet communications (Eyrich-Garg, 2010; Rice, Lee, & Taitt, 2011). Such devices can be used to receive phone calls, access Web-based interventions, or send/receive text and/or numerical data.

Mobile technology has been used successfully to assess cravings in individuals with substance use disorders (Ferguson & Shiffman, 2011; Freedman, Lester, McNamara, Milby, & Schumacher, 2006), aid in continuing care/relapse prevention for people with substance use disorders (McTavish, Chih, Shah, & Gustafson, 2012), aid in smoking cessation (Whittaker et al., 2012), assist in continuing care for people with eating disorders (Bauer, Percevic, Okon, Meermann, & Kordy, 2003; Robinson et al., 2006), supplement treatment for borderline personality disorder (BPD; Rizvi, Dimeff, Skutch, Carroll, & Linehan, 2011), monitor suicide risk for veterans (Rimoldi, Lewis, & Jampala, 2012), monitor PTSD symptoms for veterans (Smith, Harms, et al., 2012), monitor mood for people with BPD (Bopp et al., 2010), and monitor symptoms and manage medication for people with schizophrenia (Granholm, Ben-Zeev, Link, Bradshaw, & Holden, 2012; Sablier et al., 2012).

Shiffman (2009) reviewed research on ecological momentary assessment (i.e., the real-time assessment of mood, behavior, symptoms, and so forth, using portable devices) for clients in substance use disorder treatment and smoking cessation programs. He observed that research trials have demonstrated good compliance but that little has been done in the way of external validation to evaluate the accuracy of this method of reporting for these populations. Heron and Smyth (2010) reviewed a number of studies involving the use of mobile technology to treat clients in real time and in real-world settings (also known as ecological momentary interventions). They concluded that, taken together, research studies indicate that this is an effective mode of treatment for a variety of behavioral health problems (including substance-related cravings, eating disorder symptoms, and anxiety disorder symptoms) as evaluated with a diverse group of participants.

Boschen and Casey (2008) reviewed pre-2008 literature on the use of mobile devices in psychotherapy. At that time, they were only able to locate seven (mostly small) studies, but they did conclude that this technology was promising, particularly for CBT interventions. A more recent review of the research involving handheld devices, including mobile phones, in behavioral healthcare observed that such devices have been found to be effective in the treatment of anxiety and nicotine dependence (Ehrenreich, Righter, Rocke, Dixon, & Himelhoch, 2011). Mobile devices have also been used effectively to promote behavior change in relation to general health concerns, such as aiding in weight loss for individuals who were overweight (Gerber, Stolley, Thompson, Sharp, & Fitzgibbon, 2009; Patrick et al., 2009) and for HIV prevention with young men who are sexually active (Juzang, Fortune, Black, Wright, & Bull, 2011). Fjeldsoe, Marshall, and Miller (2009) reviewed studies involving the use of mobile phones to deliver text messages for a variety of behavioral changes relating to health problems, such as asthma, hypertension, and diabetes, and Nundy et al. (2014) successfully used mobile phone text messaging to improve glycemic control in employees with diabetes.

Promise of Technology for Specific Populations

Introduction

Web- and phone-based interventions may be able to reach potential clients who are not currently being served by the behavioral health system because of cost, availability of services, accessibility, or other reasons (Alleman, 2002; Andersson, 2009; Callan & Wright, 2010; Postel, De Haan, ter Huurne, Becker, & de Jong, 2011). This section details some of the populations who may especially benefit from such interventions.

Many potential clients also express a definite interest in, if not a preference for, such interventions. Mohr et al. (2010) surveyed 658 primary care patients regarding treatment preferences. Of those respondents who expressed an interest in behavioral health services (n=492), 18.7 percent were definitely interested in telephone-based treatment, and 43.7 percent would consider it, whereas 11.6 percent were definitely interested in Web-based treatment, and 36.4 percent would consider it. Individuals who cited time constraints as a potential barrier to treatment seeking were significantly more likely to be interested in telephone- or Web-based interventions. Computerized interventions are also cost-effective, and they may be indicated when a client cannot afford many in-person sessions but still requires some form of continued contact or treatment (Newman et al., 2010).

Rural Populations

Given the difficulty of accessing trained professionals in their communities, people living in rural, frontier, or remote areas may benefit from services provided via telephone or the Web (McGinty, Saeed, Simmons, & Yildirim, 2006). According to a survey of VA patients and providers living and/or working in rural areas, distance was most often cited as the greatest barrier to treatment (Buzza et al., 2011); Internet and phone technologies can help overcome this barrier. The VA has successfully instituted a number of services for veterans living in rural areas. For example, a review of VA's American Indian Telemental Health Clinics indicated that telemental health services (mental health services delivered using various telecommunication technologies) provided by these clinics were well-received by clients, generally showed

diagnostic reliability, and were less expensive than the same services provided in person (Shore et al., 2012).

A report on focus groups conducted with users of telemental health services and their therapists in frontier areas found that both therapists and consumers expressed a high level of satisfaction with such services (LaMendola, 2000). Consumers, however, had concerns that these services may not be paid for by insurers. Studies of Web-based interventions for people in rural areas have also generally found these interventions to be acceptable to this group of clients (Finfgeld-Connett, 2009; Griffiths & Christensen, 2007; Stoops et al., 2009).

People With Disabilities

Various phone- and Web-based interventions can help extend care to people with disabilities, who may otherwise have problems accessing appropriate care because of physical or cultural factors. For example, in many parts of the country, people who are Deaf may not have access to programs with staff members who are fluent in American Sign Language; Web-based interventions may help improve their access to such staff (Titus & Guthmann, 2010). There have been trials of self-directed, Web-based smoking cessation (Jones, Goldsmith, Effken, Button, & Crago, 2010) and substance use disorder treatment programs (Moore, Guthmann, Rogers, Fraker, & Embree, 2009) for people who are Deaf; both are discussed in more detail in the "Use in the Treatment of Smoking/Smokeless Tobacco Use" section. Pollard, Dean, O'Hearn, and Haynes (2009) observed that health-related materials for people who are Deaf can be improved using video, as English is a second language for many. See Vignette 4, "Incorporating TAC Into Behavioral Health Services for Clients Who Are Hearing Impaired," in Part 1, Chapter 2 of this TIP.

Web-based behavioral health interventions can also be targeted to people with specific physical illnesses. For example, van Bastelaar, Pouwer, Cuijpers, Riper, and Snoek (2011) reported on a Dutch Web site designed to reduce depression among people with type 1 or 2 diabetes. In a randomized controlled study, use of the site was associated with significantly greater reductions in symptoms of depression and diabetes-specific emotional distress than were found in a waitlist control group. Another Web-based intervention is also being tried in the Netherlands to reduce depressive symptoms among people with multiple sclerosis (MS; Boeschoten et al., 2012). In this pilot study, participants who used the Web site experienced significant decreases in symptoms of depression (measured with the Beck Depression Inventory, second edition [BDI-II]).

American Academy of Neurology (AAN) Guideline on Telephone-Administered CBT for MS
The Guideline Development Subcommittee of the AAN convened a panel of experts to make recommendations for evidence-based interventions for MS. The panel concluded that a 16-week telephone-administered CBT program (which AAN endorsed) "is possibly effective and may be considered in treating depressive symptoms" in people with MS; AAN endorsed this conclusion. (Minden et al., 2014). The weekly 50-minute telephone calls provide CBT to help clients with MS change thought processes and behaviors that reinforce depressive symptoms, manage stress, and deal with interpersonal and other problems and situations (Dolan, 2014).

Web-based interventions may also improve services for clients with cognitive deficits, as one study conducted with 160 participants in a methadone maintenance program found better abstinence outcomes among individuals with greater impairment in cognitive functioning when they used a Web-based intervention than when they received services delivered in person (Acosta, Marsch, Xie, Guarino, & Aponte-Melendez, 2012). Research from outside the behavioral health field indicates that phone and Internet messaging can help both patients and their caregivers engage in tasks that can improve behavioral as well as physical health, such as practicing relaxation training and using compensatory strategies relating to cognitive deficits (Forducey, Glueckauf, Bergquist, Maheu, & Yutsis, 2012). Although it is targeted at online educators, an October 2013 special issue of the *Journal of Asynchronous Learning Networks* (Volume 17, Issue 3) focuses on considerations related to accessibility and disabilities. These same concerns are relevant to the provision of behavioral health services online.

Students/Young Adults

College students and other young adults may be more interested in Web-delivered interventions, as their comfort level is fairly high with the technology, and they often seek health information and social support through the Internet (Wyn, Cuervo, Woodman, & Stokes, 2005). As of 2014, 97 percent of adults ages 18 to 29 used the Internet either through a computer or a mobile device, and 98 percent owned a cell phone (Pew Research Center, 2014). Use of the Internet is even more common among college students (Smith, Rainie, & Zickuhr, 2011). Other research confirms that college students often look to the Internet as a source of health information (Stellefson et al., 2011).

In one study of a screening and brief intervention for problem drinking delivered to first-year college students, 41 percent of participants who were screened as potentially having a drinking problem expressed a preference for getting further information about drinking over the Internet, and 6 percent expressed a preference for getting information by phone (Saitz et al., 2007). A number of prevention and early intervention programs targeting college students have been developed and are discussed in the "Technology To Aid in Substance Use Disorder Prevention" section. It should also be noted that although younger people may be more technically savvy and interested in these technologies, behavioral health programs using such technologies have been successfully implemented for people of all ages, including older adults (Ramos-Ríos, Mateos, Lojo, Conn, & Patterson, 2012; Westphal, Dingjan, & Attoe, 2010).

Women

There are some indications that women may have a greater preference for, and be more likely than men to engage with, computer-delivered interventions. In an evaluation of the acceptability of a computer-delivered CBT intervention for depression, women were significantly more likely to have a favorable response than were men; no relationship between age and treatment acceptability was found (Cavanagh et al., 2009). In that study, a positive expectation prior to entering treatment was associated with treatment completion, but not with treatment outcomes.

Studies on smoking cessation programs (for more detail, see the "Use in the Treatment of Smoking/Smokeless Tobacco Use" section) have also found that, in a multifaceted program, women were significantly more likely than men to use both phone and Web components of the

program (Zbikowski, Hapgood, Barnwell, & McAfee, 2008). In an intervention with only a Web component, women engaged more extensively than men with the site (Strecher et al., 2008).

Tsan and Day (2007) evaluated gender differences in attitudes toward different modes of behavioral health services (e.g., in person, video conferencing) in a group of 176 college students. They found that women held significantly more positive attitudes than men toward in-person and email counseling but not toward counseling via instant messaging, video conferencing, or voice-only communication via the Internet. Women may also benefit more than men do from some Web-based interventions. For example, female college students who used the MyStudentBody-Alcohol program drank significantly less on special occasions and had fewer negative consequences as a result of drinking after participation in the program, but that was not the case for men. In another computerized screening and brief intervention program for problem drinking among college students, women whose drinking was problematic experienced greater reductions in alcohol use than their male counterparts (Saitz et al., 2007).

Researchers in the Netherlands also found that women were substantially more likely to have a positive response when using a Web-based intervention for drinking than were men (Riper et al., 2008). Another Dutch study of a Web-based intervention for subclinical depression found that women had significantly better outcomes than did men (Spek, Nyklíček, Cuijpers, & Pop, 2008). Particular groups of women have also been successfully targeted with computer-based interventions, such as women at risk for an alcohol-exposed pregnancy (Tenkku et al., 2011) and postpartum women (Ondersma, Svikis, & Schuster, 2007). Lipman, Kenny, and Marziali (2011) reported on a pilot study that used video conferencing to conduct support groups for single mothers with low incomes; they observed that the intervention was well-received, but the study was not large enough to detect significant changes in measures of behavioral health.

People Who Are Homeless

Communication technology can help providers reach people who are homeless. For example, a pilot study was conducted with 30 individuals who were homeless and in outpatient treatment for cocaine use disorders. Each individual received a cell phone to provide real-time information concerning cravings and substance use (Freedman et al., 2006). The authors found that people who are homeless could reliably use cell phones for this purpose.

Eyrich-Garg (2010) reported on the feasibility of using cell phones for prevention and treatment with people who are homeless and not using the shelter system (hence, not easily reachable through the usual channels of service provision to people who are homeless). In a sample of 100 such individuals in Philadelphia, 44 percent already had cell phones, and 20 percent used their cell phones to access the Internet. There were no significant differences in cell phone ownership between those who had prior substance use disorder treatment and those who had none, and there were minimal differences in regard to the prevalence of mental illness. A survey conducted in Los Angeles of 169 adolescents and young adults who were homeless found that 62 percent owned cell phones, and 40 percent had phones that were currently operational (Rice et al., 2011).

Members of Specific Cultural Groups

Individuals who belong to cultural groups that have difficulties finding culturally and linguistically appropriate services from local providers may also benefit from telephone- and

Web-based services that can connect them to culturally competent providers (Mucic, 2010; Skinner & Latchford, 2011).

Skinner and Latchford (2011) and Shore, Savin, Novins, and Manson (2006) discussed the provision of culturally responsive behavioral health services using phone and Internet technology. Data evaluating the use of these technologies to provide culturally responsive services at a distance is scarce. However, Mucic (2010) reported on a Danish pilot study that used video conferencing technology to connect behavioral health clients (largely asylum seekers/refugees) to therapists who spoke their language and understood their cultural background. Participants in the pilot program (N=61) were largely comfortable with the procedure (75 percent reported no discomfort with the program), and most (85 percent) preferred it to local psychiatric services using an interpreter. Choi et al. (2012) described an 8-week Web-delivered CBT depression treatment for Chinese Australians and reported that its use was associated with significant decreases in depressive symptoms that persisted 3 months after treatment ended. They also observed that participants found the treatment acceptable and that 68 percent completed all online lessons.

McDonnell, Kazinets, Lee, and Moskowitz (2011) evaluated a Web-based smoking cessation intervention for Korean Americans, a population with a high rate of smoking; a Korean American community partner believed that members of this population were often reluctant to participate in in-person cessation programs. Participants either used the online intervention (n=562) or received similar information via printed materials (n=550). Although 30-day cessation rates did not differ significantly between the two groups, 26 percent of those who completed the online intervention had quit for at least 30 days at the follow-up assessment conducted 50 weeks after enrollment, whereas just 10 percent of those who did not complete the intervention had done so.

Groups Less Suitable for Web- and/or Phone-Based Interventions

Some technologies may be unsuitable or less suitable for certain clients. Providers of services to clients in frontier areas have observed that individuals with paranoid delusions, for example, may find some of the technology used in these interventions disturbing (LaMendola, 2000). Individuals with poor reality testing, strong transference reactions, and problems with impulsivity/aggressiveness may also have difficulties engaging in online therapy (Suler, 2001).

People with certain personality disorders may also fare better with in-person treatment than with treatment delivered via communication technologies. A reanalysis of data from a study that compared Web-based and in-person interventions for panic disorder found that symptoms of a personality disorder (in the avoidant anxious category) were associated with significantly worse outcomes for Web-based treatment than in-person treatment (Andersson, Carlbring, & Grimlund, 2008). The authors suggested that this is because it may be easier for such clients to "repair misunderstandings" when in the counselor's office. Many research studies of these interventions exclude participants who lack reading skills or have problems with written comprehension, but as Andersson (2009) noted, multimedia technology may make this limitation irrelevant.

Although people with lower socioeconomic status (SES) are less likely to have access to computer technology, and hence are less able to benefit from TAC, access is expanding relatively quickly (McNeill, Puleo, Bennett, & Emmons, 2007). Programs are in development to

create public computer centers for underserved populations (National Telecommunications and Information Administration, 2010). Due to the recent increase in use of smartphone technology, many people with lower SES now have regular access to the Internet, and rates of access using that technology are likely to continue to increase (Fox & Duggan, 2012).

Suler (2001) summarized recommendations from the International Society for Mental Health Online clinical case study group regarding individuals' potential suitability for online therapy. Among other factors, he suggested that counselors consider client preferences regarding communication methods, the client's knowledge about the use of the technologies involved, the client's comfort with and knowledge about online communication and relationships, the client's skills and comfort with the medium being used, the client's personality type and specific disorders, and the presence of significant impairments or chronic medical conditions.

Technology To Aid in Substance Use Disorder Prevention

Many substance use disorder prevention programs use computer and phone technologies (e.g., Web sites) as program components. In fact, such use is so common that it is beyond the scope of this TIP to address it comprehensively, so this section focuses on prevention programs that exclusively use those technologies (typically, Web-based interventions). In addition to these specific interventions, this technology has some more general applications relating to prevention. For example, the Internet can be used to train prevention providers (McPherson, Cook, Back, Hersch, & Hendrickson, 2006) or to improve fidelity of implementation and increase accessibility for existing prevention programs (Bishop, Bryant, Giles, Hansen, & Dusenbury, 2006).

A number of projects to increase capacity for community prevention programs have made use of such technology. Chinman, Tremain, Imm, and Wandersman (2009) examined 18 prevention coalitions in Missouri that were using the Getting to Outcomes (GTO) prevention program with a Web-based component to help programs complete GTO tasks. The authors compared these coalitions with eight coalitions in the same state that were using GTO without the additional component. They found that those that used the Web-based component did significantly better at performing key planning, implementation, and evaluation activities related to GTO.

One area of computer-delivered prevention that has been reasonably well-evaluated is the use of these technologies to help reduce drinking/binge drinking among college students. Carey, Scott-Sheldon, Elliott, Bolles, and Carey (2009) conducted a meta-analysis of 43 separate interventions (from 35 publications) that were intended to reduce alcohol use among college students. They found such interventions more effective at reducing the amount of alcohol consumed on specific occasions in the short term and total alcohol consumption (over periods of weeks or months) in the long term than no-treatment or assessment-only controls. They concluded that such interventions are cost-effective and can reduce drinking in this population, being more effective than no-treatment controls and about as effective as active controls.

MyStudentBody

MyStudentBody.com includes a series of prevention modules aimed at college students, including three specifically oriented toward preventing the use/misuse of alcohol, drugs, and tobacco. Each component has been or is in the process of being evaluated, and other modules

(notably MyStudentBody-Stress [MSB-S]) may have an effect in reducing substance use disorders.

For the evaluation of MyStudentBody-Alcohol (MSB-A), 265 students were randomly assigned to use the MSB-A interactive Web site or a Web site that provided research-based articles on drinking (Chiauzzi, Green, Lord, Thum, & Goldstein, 2005). All were assessed using the Daily Drinking Questionnaire, the Rutgers Alcohol Problem Index, and the Readiness to Change Questionnaire at baseline, at the conclusion of the intervention, and 3 months later. Participants in both intervention and control groups reduced alcohol consumption over the course of the study, and there were few differences between the groups as a whole. However, for women only, the use of MSB-A compared with use of the control Web site was associated with significantly less drinking during special occasions and fewer negative consequences as a result of drinking. Also, for persistent, heavy binge drinkers and for participants who had low motivation to change their drinking behavior, use of MSB-A was associated with a more rapid decrease in average and peak alcohol consumption compared with use of the control site.

MyStudentBody-Parent (MSB-P) is a newer intervention aimed at parents of college students to help them communicate with their children about hazardous drinking (Donovan, Wood, Frayjo, Black, & Surette, 2012). In an evaluation involving 558 parents randomly assigned to the intervention or to a control group who received general information about college student drinking and drug use via email, those who participated in MSB-P were significantly more likely to discuss strategies to reduce or avoid alcohol use with their children, and their children were significantly more likely to state that they used such strategies.

College Alc

The College Alc program is a multimedia educational intervention that provides information about drinking norms, the effects of alcohol, and safe drinking practices. College Alc was evaluated (Paschall, Bersamin, Fearnow-Kenney, Wyrick, & Currey, 2006) with first-year college students who were randomly assigned to receive the intervention (n=173) or to a control group (n=197). Although there were no significant differences between the two groups in terms of drinking outcomes, those who received the intervention had significantly more knowledge about alcohol, fewer positive attitudes toward alcohol use, and greater expressed intentions to limit alcohol-related harm following the intervention than did those in the control group. In a secondary analysis of these data, Bersamin, Paschall, Fearnow-Kenney, and Wyrick (2007) found that participants who reported drinking in the month prior to the baseline assessment and who received the intervention had decreases in incidents of heavy drinking, drinking to intoxication, and alcohol-related consequences; those who reported past-month drinking and were in the control group had increases in those areas.

AlcoholEdu

Another college-oriented, Web-delivered alcohol prevention program, AlcoholEdu, was designed for use with all students attending a school (instead of a targeted, high-risk group). It has been evaluated at 225 different campuses with 24,877 students who were randomly assigned to the intervention or to no-intervention control groups (Wall, 2007). In this initial assessment of the program, which looked only at those participants who completed a follow-up assessment (49.5 percent of the total), students in the intervention group reported significantly fewer

negative consequences of drinking, fewer days of heavy drinking, and less intentionally risky drinking behavior. However, those results need to be considered in light of high participant dropout.

Two more recent evaluations of AlcoholEdu had mixed results. In a randomized trial conducted with 1,891 first-year students, participants who received the intervention had better alcohol knowledge but failed to show better alcohol-related outcomes (with the exception of less frequent participation in drinking games) than did those who were in an assessment-only control group (Croom et al., 2009). In the other study, conducted with 1,620 first-year students randomly assigned to the intervention or to an assessment-only control group, 91.5 percent of those who received the intervention and 67.9 percent of those in the control group completed the 1-month follow-up (Lovecchio, Wyatt, & DeJong, 2010). In this trial, the authors did find that, at the 1-month postintervention assessment, those who used the AlcoholEdu Web site had, compared with those in the control group, significantly fewer negative consequences from drinking and reported significantly less alcohol use. The authors noted, however, that participants who did not complete the study were lighter drinkers in the baseline assessment, and thus larger dropout rates in the control group could have skewed the results.

Yet another evaluation of AlcoholEdu was conducted by Paschall, Antin, Ringwalt, and Saltz (2011) with students from 30 different colleges and universities across the United States (15 of which used AlcoholEdu and 15 of which provided a control group). Compared with students in the control group schools, students at schools providing AlcoholEdu had significantly greater reductions in past-month alcohol use and binge drinking episodes, but the differences did not persist after the semester in which the intervention was delivered. However, in a post hoc analysis, the authors did find a significantly greater effect in schools that had a higher rate of completion for the intervention (often because a school mandated completion).

Hustad, Barnett, Borsari, and Jackson (2010) randomly assigned 150 first-year college students to receive AlcoholEdu or the electronic program Check-Up to Go (e-CHUG; see the next section) or to an assessment-only control group. At a 1-month follow-up assessment, participants in both interventions reported significantly less alcohol use than did those in the control group. Those who used the AlcoholEdu program had significantly fewer negative consequences from drinking (evaluated with the Young Adult Alcohol Consequences Questionnaire) than did those in the control group, but the difference in that outcome measure was not significant for those who used e-CHUG (although the trend was in the same direction).

e-CHUG and Drinker's Check-Up Programs

A third commercially available program developed to reduce alcohol use by college students is the e-CHUG program, which also provides assessment and individualized feedback; it appears to be more promising as a form of indicated prevention than as a universal prevention program (Hustad et al., 2010).

The program was evaluated with a group of 106 first-year students who had previously indicated that they engaged in heavy episodic drinking as well as 245 students who were abstainers or light drinkers (Walters, Vader, & Harris, 2007). Participants were randomly assigned to receive the e-CHUG intervention or to receive periodic drinking assessments alone. Among those who were heavy episodic drinkers prior to the study, use of e-CHUG was associated with significantly

greater reductions in drinks per week and estimated blood alcohol content on the day of heaviest drinking at the 8-week assessment compared with assessment alone. However, by the 16-week assessment, there were no longer significant differences between the groups due to drinking reductions among the control group. There were no significant effects on drinking for individuals who were abstainers or light drinkers prior to the study.

In another, smaller evaluation of e-CHUG, 80 first-year students (52 of whom were available for a 3-month assessment) were randomly assigned to receive e-CHUG or assessment alone (Doumas & Andersen, 2009). Among participants who engaged in binge drinking in the 2 weeks prior to the study (and were thus considered high-risk drinkers), those who used the e-CHUG site reported significantly less drinking and had significantly fewer problems resulting from drinking (according to the Rutgers Alcohol Problem Index), but there were no significant differences for participants who were not high-risk drinkers. However, the significance of this finding was equivocal and varied according to the method used to determine significance. Also, individuals who did not complete the study had significantly more alcohol-related problems at baseline than did those who remained in the study, which may have affected findings. Another evaluation of e-CHUG for first-year university students (N=350) found that those who used the program, compared with those assigned to an assessment-only control group, had significantly greater reductions in days of heavy drinking and in drinking-related negative consequences (Doumas, Kane, Navarro, & Roman, 2011). Also, students who were assessed as being at high risk for alcohol use disorders and who used e-CHUG reduced peak drinking by 58 percent and drinking to intoxication by 65 percent, compared with increases of 11 percent and 15 percent, respectively, for high-risk participants in the control group.

In another study of e-CHUG, 103 students were randomly assigned to the intervention, to behavioral skills training in self-management, or to a control group (Lane, Lindemann, & Schmidt, 2012). The authors found that drinking increased significantly for heavy drinkers if they were assigned to the self-management or control groups, but not if they used e-CHUG. On the other hand, lighter drinkers decreased their drinking significantly more if they received the self-management training rather than if they were in the eCHUG or control groups. The authors concluded that schools may get a better response if a given student's drinking behavior is used to match that student with a prevention program.

The e-CHUG program is based on a computerized brief motivational intervention known as Drinker's Check-Up. In an initial study of Drinker's Check-Up conducted with 61 individuals who were considered problem drinkers (i.e., had scores of 8 or higher on the Alcohol Use Disorders Identification Test [AUDIT]), those who received the intervention and completed follow-up assessments had significant reductions in drinking quantity, frequency of drinking, and alcohol-related problems that were greater in the short term than those of the delayed treatment control group and that persisted for 1 year after treatment (Hester, Squires, & Delaney, 2005). In a more recent evaluation involving two trials conducted with college students (N=226), those who used the Drinker's Check-Up had significantly greater improvements that were found at both 1-month and 12-month posttreatment assessments on one or more measures of alcohol consumption (depending on the specific trial) than did individuals in delayed assessment-only control groups (Hester, Delaney, & Campbell, 2012).

Other Substance Use Disorder Prevention Programs

Lewis, Neighbors, Oster-Aaland, Kirkeby, and Larimer (2007) researched an alcohol-related prevention program for first-year students who had indicated in a survey conducted in class that they had engaged in at least one heavy drinking episode in the prior month. Participants (N=316) were assigned to a gender-neutral or a gender-specific version of the intervention or to an assessment-only control group. For the interventions, participants provided information on drinking behavior as well as beliefs about drinking. Feedback was then generated that addressed the participant's drinking behavior, his or her perception of typical student drinking, and information about actual student drinking norms that was either generalized to all students or specific to students of the participant's gender. At a 5-month postintervention assessment, students who received either version of the intervention were reporting significantly fewer drinking occasions and fewer drinks per week than were those in the control group. Although results were not significantly different between the two interventions, those who received the gender-specific feedback did report less drinking than those who received the gender-neutral feedback. At follow-up, those who received the intervention also reported significantly lower estimates of their fellow students' drinking frequency and drinks per week.

Neighbors, Lee, Lewis, Fossos, and Walter (2009) evaluated a Web-based prevention intervention specifically designed to reduce drinking on college students' 21st birthdays. Students who had expressed an intention to consume two or more drinks on their 21st birthday were randomly assigned to use either a control Web site that simply assessed their alcohol use or the intervention Web site, which, in addition to assessment, provided personalized feedback about drinking. Participants were reassessed 1 week after their birthdays. Those who used the intervention site had significantly lower estimated blood alcohol content on their birthdays compared with those who were in the control group. This effect primarily occurred for individuals who had intended to drink large quantities on their birthdays. Doumas, McKinley, and Book (2009) compared a normative feedback Web site (http://www.CheckYourDrinking.net) and an alcohol education Web site (http://www.judicialeducator.com/main.asp) with 76 students who were referred for mandated services as a result of violating the school's alcohol and drug policy. At a 30-day postintervention follow-up assessment, students who used the CheckYourDrinking intervention reported significantly less weekly drinking, lower alcohol consumption on the day of greatest drinking, less frequent drinking to intoxication, and lower estimates of peer drinking compared with students who used the alcohol education site.

Technology-Based Products To Prevent High-Risk Drinking Among College Students
The Substance Abuse and Mental Health Services Administration (SAMHSA) sponsored a challenge for the top three products to prevent college high-risk drinking, and in 2013 the winners were Syracuse University's BeWise interactive Web site, the University of Central Florida's Expectancy Challenge Alcohol Literacy Curriculum mobile app (designed to present information in a nonjudgmental manner), and the University of Tennessee's Alcohol and You (an online module to educate all incoming first-year students about the choices regarding and consequences of alcohol use).
Source: Lucey, 2005.

Although almost all substance use disorder/illicit use prevention programs for adults are aimed at college students, some have been developed for women of childbearing age. Tenkku et al. (2011) evaluated a Web-based intervention to reduce alcohol use among women (*N*=458, of whom 319 were available for follow-up) who were considered to be at risk for an alcohol-exposed pregnancy because they had consumed alcohol in the past 30 days and did not use reliable contraception. Participants were randomly assigned to complete the intervention or to receive printed materials through the mail that conveyed the same information. Four months after the intervention, 58 percent of all participants were no longer considered at risk for an alcohol-exposed pregnancy. Women who used the Web-based intervention were 34 percent less likely to be at risk for alcohol-exposed pregnancy at the follow-up assessment than were those who received the printed materials, but the difference was not significant.

In a study of 150 women who were receiving Women, Infants, and Children services in San Diego County and reported drinking at least at a moderately risky level (i.e., who scored two or higher on the Tolerance, Annoyed, Cut-Down, Eye-Opener screening instrument) were randomly assigned either to use a Web-based assessment and brief intervention, which was adapted from the e-CHUG intervention described in the "e-CHUG and Drinker's Check-Up Programs" section, or to receive printed information about normal drinking patterns and the health effects of alcohol on women and unborn children (Delrahim-Howlett et al., 2011). Although there were no significant differences in outcomes for participants in the two groups, 70 percent of all participants did reduce their number of risky drinking episodes.

Technology To Aid in Mental Health Promotion

Programs are making use of new technologies in a number of ways to further mental health promotion/mental disorder prevention. A meta-analytic review of 75 randomized controlled trials involving computer/Internet interventions for reducing behavioral health risks and/or promoting behavioral health found that such interventions can result in significant improvements in a number of areas relating to behavioral health, especially in the short term (i.e., when assessed at the conclusion of the intervention; Portnoy, Scott-Sheldon, Johnson, & Carey, 2008). The authors cautioned, however, that many of the studies they reviewed have methodological problems, and more long-term research is needed.

Mitchell and colleagues (2009) observed that Web applications allow for the tailoring of mental health promotion/mental illness prevention activities to the individual client, thereby potentially increasing the efficacy of such interventions compared with those delivered through traditional media (e.g., television or printed public service announcements). They also noted the ability of Web-based activities to reach a larger audience at lower cost and to be sustainable over a longer period of time. Screening programs for prevention as well as for problem identification are discussed further in the "Technology in the Treatment of Mental Illness" section.

Positive Psychology

One area of mental health promotion that has embraced the use of the Internet is the field of positive psychology, an approach to mental health that seeks to increase happiness (perceived as involving positive emotion, engagement, and meaningfulness), which in turn builds mental health resilience and appears to decrease symptoms of some mental illnesses (Seligman, Rashid, & Parks, 2006; Seligman, Steen, Park, & Peterson, 2005). The first research trial of a positive

psychology intervention using the Internet had a very basic design in which a convenience sample of participants (411 of whom completed all follow-up assessments) was recruited over the Internet and received instructions via email (Seligman et al., 2005). Participants were assigned to complete one of six different exercises (five related to personal happiness and one that was a placebo). At an assessment 6 months after the intervention, completion of two of the exercises was associated with significant increases in happiness (according to the researchers' own measure) and significant decreases in depressive symptoms as measured by the Center for Epidemiological Studies Depression Scale (CES-D).

An Australian study by Mitchell et al. (2009) used a more dynamic, interactive Web-based approach for delivery and compared a strengths-based positive psychology intervention that taught and helped people practice problem-solving skills with an intervention that provided information on problem-solving skills without any interactive features or any attempt to get participants to apply those skills. The authors found that although participation in the positive psychology intervention was, at a 3-month postintervention follow-up, associated with significant improvements in participants' well-being (or happiness) according to two of the instruments used, it was not associated with any changes in depression, anxiety, or stress as measured by the Depression, Anxiety, Stress Scales–21.

Depression and Anxiety Prevention

Another example of a Web-based program that could be considered mental health promotion as well as substance use disorder prevention is the MSB-S intervention (related to the other MyStudentBody sites already described), which teaches and helps students use stress management techniques (Chiauzzi, Brevard, Thum, Decembrele, & Lord, 2008). In a research trial of the intervention, students at six different colleges were randomly assigned to the MSB-S Web site intervention (n=77), to a control group that used a Web site that provided health information and sought to encourage physical exercise (n=78), or to a no-treatment control group (n=80). Those who used the MSB-S site increased their use of specific stress management skills. Also, participants who used the MSB-S site showed an initial significant decline in anxiety (as measured by the College Adjustment Scales anxiety subscale), but at the last follow-up assessment (6 months after the intervention), anxiety scores were about equal for the intervention and control Web site groups.

A Web-based anxiety disorder prevention program was evaluated in Australia with a group of college students (N=42) who had previously screened as having high anxiety sensitivity (Kenardy, McCafferty, & Rosa, 2006). In a 6-month follow-up assessment, those participants who had been randomly assigned to the intervention had, compared with those in a waitlist control group, significantly lower (p<0.01) anxiety-related thoughts (according to scores on the Catastrophic Cognitions Questionnaire-Modified) and fewer depressive symptoms (on the CES-D). Other measures of anxiety also indicated declines in anxiety, but differences from the control group were not significant.

Other interventions are available for mental illness or mental illness symptoms, but for many of them, there are few data to support their use. Patten (2003) reported on a psychoeducational program delivered by computer or telephone that was designed to prevent depressive symptoms, but a randomized controlled evaluation of 786 participants found that the intervention was associated with no better outcomes than an information-only control group. Finkelstein and

Lapshin (2007) reported on a Web-based program that, although not related to prevention per se, was designed to reduce the effects of prejudice associated with depression and increase knowledge about the disorder, which in turn might aid in early treatment-seeking for those with depressive symptoms. In an evaluation with 42 college students and faculty, use of the program was associated with significant decreases in depression-related prejudice (assessed using the Bogardus Social Distance Scales).

Suicide Prevention

Suicide prevention activities have a long history of being conducted using communication technologies, and suicide or crisis intervention hotlines are widespread and generally considered an effective way to prevent suicides (Gould et al., 2007). For people in crisis who may not be suicidal, these hotlines also provide referrals and help reduce callers' feelings of being overwhelmed (Gould et al., 2007). Within the United States, many crisis hotlines have joined together as part of the National Suicide Prevention Lifeline network (1-800-273-TALK), which is able to provide nationwide coverage 24 hours a day, 7 days a week. Online resources for suicide prevention have been developed, including the National Suicide Prevention Lifeline Web site (http://www.suicidepreventionlifeline.org), which is sponsored by SAMHSA. Since 2011, SAMHSA and the National Suicide Prevention Lifeline have collaborated with Facebook, and in 2015, SAMHSA continues to use Facebook in its prevention efforts (see http://www.samhsa.gov/prevention-week).

Web-based suicide risk monitoring and referral programs are also available. Haas and colleagues (2008) evaluated such a program with 1,162 students at two different universities. The students completed an online screening instrument that incorporated an existing depression screener (the Patient Health Questionnaire 9-Item Scale [PHQ-9]) as well as other items relating to suicide (e.g., substance use, anxiety). The computer scored responses into three categories of suicide risk; those who were considered to have a moderate or high risk for suicide received personalized email responses from a counselor that addressed issues of potential concern for the student and provided different referral options for further counseling. A large percentage of the respondents (84.4 percent) fell into the moderate-risk or high-risk categories. As a result of the program, 19.4 percent attended an evaluation session with a counselor, and 13.5 percent entered treatment. If students engaged in an online dialog with a counselor after receiving their initial feedback email, they were almost three times more likely to receive an evaluation and to enter treatment.

Computer software that can screen and assess suicide risk has been available for quite some time. In an early pilot evaluation involving 21 individuals with suicidal ideation, 58 percent expressed a preference for talking with a computer instead of a person (Greist et al., 1974). Later research indicated that, in evaluating case histories of 20 individuals receiving mental health services (10 of whom later attempted suicide), the computer was significantly more accurate than a group of psychiatrists and psychiatric residents in predicting suicide attempts. The computer predicted 70 percent of cases compared with counselors, who predicted 38 percent (Gustafson, Greist, Strauss, Erdman, & Laughren, 1977). Rimoldi et al. (2012) presented information from a VA pilot study involving the use of text messages sent via mobile phones to assess and manage suicide risk in a group of 11 veterans considered to be at high risk for suicide. Participants regularly responded to questions concerning their mental status, and when no answer was received or responses

indicated an increase in risk, a Suicide Prevention Coordinator responded accordingly. The intervention was well-received, but three participants dropped out because of personal costs.

Another military suicide prevention program, which is run by DoD and thus serves active-duty personnel, uses email or handwritten messages sent at regular intervals to individuals who have been hospitalized for a mental disorder (Luxton, Kinn, et al., 2012). Although program users may select email or paper messages, the majority preferred the email option (72 percent of participants in the pilot study). The pilot study, however, did not yield any significant data.

Video conferencing can also be used to monitor suicide risk and intervene when necessary. Godleski et al. (2008) discussed VA efforts to assess suicidality using high-speed video conferencing technology. They presented VA's best practice guidelines and discussed legal and licensing concerns. Gros, Veronee, Strachan, Ruggiero, and Acierno (2011) presented a case study, also involving a veteran, of the use of video conferencing to manage suicidality.

Eating Disorder Prevention

Another area where there have been a number of efforts to use communication technology is in the prevention of eating disorders. However, not all interventions in this area have been effective. Newton and Ciliska's (2006) review of five published studies did not find any significant effect on reducing eating disorders following implementation of Web-based prevention programs. A review by Yager and O'Dea (2008) of eating disorder prevention programs for college students, which included interventions delivered in person as well as those delivered by computer, found that information-based, CBT, and psychoeducational interventions had only limited success but that interventions that built self-esteem to improve body image, including ones that used computer technology, were more effective.

Two studies of the Student Bodies Web-based program, which includes modules addressing factors related to risk for eating disorders (including body image, weight, and nutrition) have found that the program may be helpful, at least in some cases, in reducing eating disorders among college-age women. In the larger study (N=480), there were no significant differences in eating disorder risk between intervention and control groups taken as a whole, but for participants who began the study with an elevated body mass index (of 25 or greater) and those who engaged in compensatory behaviors (e.g., self-induced vomiting, laxative use, diet pill use) at baseline, participation in Student Bodies was associated with significantly better outcomes (Taylor et al., 2006).

In another study (Low et al., 2006), 61 female undergraduates were randomly assigned to use Student Bodies by itself (n=14), the program with the addition of an unmoderated online discussion component (n=19), the program with moderated discussion (n=14), or a no-intervention control group (n=14). The authors found a significant relationship between participation in the program (for all three intervention groups taken together) and lower risk for eating disorders as indicated by scores on the Eating Disorders Inventory Drive for Thinness and Body Dissatisfaction subscales (but not the bulimia subscale) during the 8- to 9-month follow-up period. Eleven participants who did not complete the study were not included in the analysis. Although the authors cautioned that it was difficult to evaluate differences among the three intervention groups because of the small sample size, participants in the group with unmoderated

discussion had the greatest reductions in eating disorder risk, suggesting that having a moderated discussion was unnecessary.

Another study of an indicated prevention intervention that used moderated discussion as well as psychoeducation, homework tasks, and a monitoring component (in which the discussion group monitor attempted to identify problematic messages that might require clinical intervention) also found benefits for college-age women who were at risk for developing eating disorders based on scores on the Weight Concerns Scale (Zabinski, Wilfey, Calfas, Winzelberg, & Taylor, 2004). At an assessment 10 weeks after the intervention, participants in the intervention group (n=30), compared with those in the control group (n=30), had significantly greater self-esteem and significantly greater improvements in eating disorder pathology as measured by the Eating Disorder Examination Questionnaire and two of its subscales (Eating Concern and Weight Concern).

A Web-based program developed in Germany is designed to provide both prevention and early intervention for eating disorders by including an eating disorder monitoring component that results in referrals to treatment when eating disorder symptoms reach too severe a level (Bauer, Moessner, Wolf, Haug, & Kordy, 2009). A pilot program found that the intervention could be successfully implemented, but outcome data are still lacking. Franko et al. (2005) evaluated a CD-ROM eating disorder prevention program called Food, Mood, and Attitude with 240 female first-year college students who were randomly assigned to the intervention or to an assessment-only control group. At a 3-month postintervention assessment, those who used the intervention had significantly greater improvements than control group members in a number of areas connected to the development of eating disorders (e.g., attitudes relating to thinness, body shape, and weight) and were significantly more likely to decrease the use of purging methods (e.g., vomiting, laxatives, diuretics).

In an Australian trial (Paxton, McLean, Gollings, Faulkner, & Wertheim, 2007), women who had been screened as having a high degree of body dissatisfaction (according to Body Shape Questionnaire or Bulimia Test Revised scores) were randomly assigned to a group receiving an in-person intervention (n=42), a group receiving a Web-delivered intervention (n=37), or a waitlist control group (n=37). Individuals were not excluded if they met criteria for a current eating disorder, but they did not have to meet those criteria, either; therefore, this intervention could be considered as treatment or indicated prevention. Participation in either intervention group was associated with significant improvements in terms of body dissatisfaction, but the effect during the 6-month follow-up period was more lasting for those who received the intervention in person rather than over the Internet.

Technology in the Treatment of Mental Illness

As noted previously, phone and computer technologies have been successfully used for screening, assessing, and treating a variety of mental disorders. They have been used as stand-alone interventions and as adjuncts to treatment that takes place in person. This section of the literature review discusses general screening and assessment, the treatment of specific mental disorders, and other applications of these technologies (e.g., peer support groups, family support services).

VA Reports 80,000 Veterans Took Part in More Than 200,000 Telehealth Consultations in 2012

The VA's telehealth system is "a service designed to allow thousands of veterans from remote parts of the country to consult with specialists in medical facilities hundreds of miles away.… The virtual appointments included vets receiving care and counseling for chronic medical conditions and for mental health counseling.

Dr. Robert Petzel, under secretary for health at the VA, said that virtual appointments are making a significant difference in the lives and health of patients. He told of one veteran who was driving 45 minutes in city traffic to keep in-person appointments with his mental health counselor. 'He would fight the traffic, be angry and upset by the time he got to see his therapist,' Petzel said, 'and it would not be a particularly productive therapy session. He now participates in a tele-mental health program where he does his therapy from his home.'

'We've interviewed him. He points out the fact that now he's relaxed, in an environment he's comfortable in, he's not upset about the traffic and he's getting infinitely—and he used the word infinitely—more out of his therapy sessions now that he doesn't have to travel that distance.'"

Source: http://www.military.com/daily-news/2013/07/31/va-touts-telehealth-program-used-by-80k-vets.html

Use in Screening and Assessment

Computer and phone technologies have been used for many years for screening and assessing mental illness (as well as substance use disorders, which are discussed later). Although an in-person assessment is usually preferable, it is not always feasible, and the use of computer technologies, particularly video conferencing technology, can be effective for assessing clients' behavioral health (Barak & Buchanan, 2004; Bickel, Christensen, & Marsch, 2011; Butcher, Perry, & Hahn, 2004; Maheu et al., 2004).

Phone-based screening and assessment

A variety of research has found that telephone interviews are an effective way to screen, assess, and diagnose a number of different mental disorders (Maheu et al., 2004). For example, Kobak et al. (1997) found, in a study that compared diagnoses made using automated telephone screening with those made using the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (SCID-IV) delivered by clinicians over the phone (N=200), no substantive differences in rates of specific mental disorders were found, with the exception of alcohol abuse, which was more likely to be reported in the automated interview. Findings were similar in a comparison of the Hamilton Depression Rating Scale and the Hamilton Anxiety Rating Scale administered via phone by a computer versus by trained clinicians (Kobak, Greist, Jefferson, Mundt, & Katzelnick, 1999).

Some disorders, however, may be harder to diagnose over the phone. For example, Rohde et al. (1997) found poor agreement between telephone and in-person assessments of adjustment disorder with depressed mood, but not for other disorders assessed in their study. Voice-automated telephone technology also makes it possible to use phones to conduct automated

screening and assessment. For example, Xu et al. (2012) described and provided preliminary psychometric data for a voice-automated PTSD screening and monitoring program that is still in development. Phones can also be used to provide ongoing assessment and monitoring for clients with mental illness and to improve self-care and medication compliance. For example, Maust et al. (2012) found that a Commonwealth of Pennsylvania program that used telephones to provide regular clinical assessments and feedback to older adults taking psychotropic medications was associated with significantly greater medication regimen compliance and significantly greater improvements in depressive symptoms and overall mental well-being than found in older adults using standard services alone.

Screening and assessment using video conferencing

Assessments conducted using video conferencing have also been found to be accurate in a number of studies (Bickel et al., 2011; García-Lizana & Muñoz-Mayorga, 2010a; Norman, 2006; Sharp et al., 2011). For example, Singh, Arya, and Peters (2007) compared assessments conducted using video conferencing technology with ones conducted in person with the same group of 37 consecutive admissions to a community mental health facility, and they found substantial agreement in almost every area. The one exception to this was in the assessment of an individual's risk to others (but not to self).

A meta-analysis of 14 studies that included data from objective assessments conducted using video conferencing over the Internet and comparison data from in-person interviews found no differences in assessments conducted using the two methods (Hyler et al., 2005). The authors did, however, find that low bandwidth may be less effective. In its review of video conferencing, the ATA (2009) concluded that there is good evidence showing that clients adapt to assessment interviews conducted with video technology and respond with as much information as they would if assessed in person. They also noted anecdotal evidence that people with certain disorders (i.e., PTSD, agoraphobia, eating disorders) may feel safer if assessed using this technology.

Another review by Richardson et al. (2009) found strong evidence that clinical assessments conducted using video conferencing technology were as reliable as assessments conducted in person. Other reviews of video conferencing have also concluded that the technology is reliable for conducting assessments and psychiatric interviews (Sharp et al., 2011, Simpson & Morrow, 2010). In a study of video conferencing as a means of conducting psychiatric interviews, which involved 43 interviews of 14 different clients, Turner (2001) found that both the psychiatrists who performed assessments and the clients who received them had a favorable attitude toward the technology.

Yellowlees et al. (2012) evaluated the feasibility of using asynchronous mental health evaluations that involved video sent via the Internet. In that study, psychiatric interviews were conducted by a primary care doctor using the Mini-International Neuropsychiatric Interview and recorded for viewing by a psychiatrist at a later time, who in turn provided a psychiatric diagnosis. The authors found that the process worked well and enabled psychiatrists to observe and diagnose clients who would not otherwise be able to see such professionals because of a lack of mental health professionals in their area. However, some research indicates that certain aspects of assessment (e.g., assessing negative symptoms of psychosis) may be more accurate when done with higher-bandwidth connections (Sharp et al., 2011). Maheu and colleagues

(2004) discussed in greater detail these and other important technical aspects of video conferencing in relation to behavioral health services. There are also some indications that substance use disorders may not be assessed as accurately using video conferencing as they are when assessed in person (Shore, Savin, Orton, Beals, & Manson, 2007).

Web-based screening and assessment

Computerized assessments have been developed for a large number of instruments, and research generally indicates that computer delivery is effective for screening and assessing most clients. Butcher et al. (2004) reviewed research on the use of computerized assessment in three areas: personality assessment, neuropsychological assessment, and computerized adaptive testing (CAT). They cited research supporting the use of computers in all three areas, concluding that these methods are effective and that their use improves behavioral health services. Research has also indicated that, in general, clients seeking treatment for mental illness respond favorably to automated assessments (Hile & Adkins, 1997).

Many well-known and often-used instruments have been adapted for the computer, but a complete list of all computerized assessments is beyond the scope of this literature review. Butcher, Perry, and Atlis (2000) reviewed earlier literature on the validity and utility of some of the most widely used instruments, including iterations of the Minnesota Multiphasic Personality Inventory, the World Health Organization Composite International Diagnostic Interview, and the Computerized Diagnostic Interview Schedule. For some clients, completing a computerized or Web-delivered assessment is preferable to answering questions delivered by another person, as the latter may be more embarrassing (Butler, Villapiano, & Malinow, 2009; Joinson & Paine, 2007; Lessler, Caspar, Penne, & Barker, 2000; Newman et al., 2010). Computerized assessments can also help ensure standardized delivery and completeness of data (Newman et al., 2010).

Guided assessment

Technology is now available that can guide clients through a self-assessment process using audio instructions, a process known as audio computer-assisted self-interviewing (ACASI). Chinman et al. (2007) conducted a feasibility study of ACASI in mental health clinics and found that it was well-received by providers and by clients with serious mental illness. The same type of system was also evaluated for use with a more extensive interview—that used in a National Household Survey on Drug Abuse (Lessler et al., 2000). The ACASI version of the survey was given to 1,982 respondents and was found to improve reporting of drug use among young people and to be helpful in correcting inconsistencies in reporting, and it was particularly useful for respondents who would have had problems with text-based questions.

Adaptive testing

Another way that new technology can improve assessment is through the application of CAT techniques, which use answers from prior questions to select only the necessary questions for the assessment and thereby decrease the amount of time required to give and score the instrument (Butcher et al., 2004). Butcher and colleagues (2004) reviewed earlier research on the use of adaptive testing in behavioral health services. When Gibbons and colleagues (2008) combined item response theory and CAT to study features of the 626-item Mood and Anxiety Spectrum Scales with 800 clients, they found that 95 percent of participants (765 clients) preferred answering the questions using a computer rather than a paper-and-pencil method.

Web-based screening and assessment instruments

In general terms, simple screening instruments and surveys are as likely to be valid when delivered over the Internet as when delivered by mail (Ritter, Lorig, Laurent, & Matthews, 2004). However, more complex assessment instruments may not adapt equally well to Internet use, as factors such as social desirability, willingness to self-disclose, and computer anxiety may affect the validity of online assessment (Vallejo, Jordan, Diaz, Comeche, & Ortega, 2007). Butcher and colleagues (2004) also discussed some potential problems involved in online psychological assessment; these included ensuring equivalent test-taking attitudes, test norms that are appropriate for Internet delivery, test validity, and test security.

The delivery via the Internet of a number of specific instruments has been evaluated. For example, Vallejo et al. (2007) evaluated whether or not the psychometric properties of the General Health Questionnaire-28 (GHQ-28) and the Symptoms Check-List-90-Revised (SCL-90-R) varied when administered over the Internet versus with paper and pencil. They found that the psychometric properties of the GHQ-28 were similar for both delivery methods and thus recommended the Internet version for use. However, although the SCL-90-R had high internal consistency regardless of the delivery method, the paper version produced higher scores, and the authors therefore could only recommend its online version as a general index of mental disorder symptoms but not as an assessment instrument. The Neuropsych Questionnaire is another example of a computerized assessment instrument that can be delivered by computer either over the Internet or in an office (Gualtieri, 2007). The instrument, which evaluates 20 different clusters of symptoms, was found to be reliable, to effectively discriminate different diagnoses, and to produce results comparable with those produced by other well-known scales.

A number of screening and assessment instruments have also been developed specifically for delivery over the Internet. For example, the Web-Based Screening Questionnaire is a brief screening instrument developed for use online; it screens for major depression, alcohol use disorders, GAD, PTSD, social anxiety disorder, panic disorder, agoraphobia, specific phobia, and OCD (Donker, van Straten, Marks, & Cuijpers, 2009). The specificity and sensitivity of the instrument varied according to the particular diagnosis, but after modifications were carried out following this initial research, all scores fell within an acceptable range (0.72–1.00 for sensitivity and 0.44–0.77 for specificity). Another example is the Web-Based Depression and Anxiety Text, which is a self-report screening instrument originally developed for use in primary care settings. It screens for most anxiety disorders (except GAD) and depression with good sensitivity (0.71–0.95) and specificity (0.87–0.97; Farvolden, Cunningham, & Selby, 2009; Farvolden, McBride, Bagby, & Ravitz, 2003).

One potential concern with Internet screening instruments is whether users will seek treatment if they screen positive for a disorder. Van Ameringen, Mancini, Simpson, and Patterson (2010) evaluated the use of MACSCREEN, an online screening program for mood and anxiety disorders, and found that the majority (60.3 percent) of the 302 users in their evaluation said they would use the information provided to seek further assessment/treatment. The majority of users (62.3 percent) also indicated that they used the assessment Web site because they were already concerned that they had a problem with anxiety. Computer- or Web-delivered screening instruments can be more easily tailored to specific populations or for specific disorders and can reach a wide audience at a relatively low cost compared with interventions delivered in person. Houston et al. (2001) evaluated a Web-based depression screening program that used a

computerized version of the CES-D to screen a large (*N*=24,479) general population sample. The screening program used a cutoff score of 22 or greater on the CES-D to indicate a high probability of clinical depression, and individuals with scores in that range were advised to seek professional help. More than half (58 percent) of those who took the screening test had scores of 22 or higher. The Web-based screening—compared with earlier, in-person, general population depression screenings—had a larger percentage of younger participants but a smaller percentage of people of color. The overall cost per person for the screening was quite low.

Le, Perry, and Sheng (2009) evaluated both in-person and Web-delivered versions of a screening instrument (the Postpartum Depression Screening Scale) with a convenience sample of women who had recently given birth and found that it had excellent internal consistency and construct validity. They also found that women who chose online rather than in-person screening were significantly more likely to be screened as at risk for postpartum depression and were more likely to be Asian or Latina.

Screening and assessment using mobile technology

The use of handheld devices allows for ecological momentary assessment, also known as structured momentary assessment, a process whereby clients can report real-time information about symptoms, experiences, feelings, cravings, or other factors associated with their disorder(s). This technique has been used to assist in the treatment of schizophrenia (Granholm, Loh, & Swedsen, 2008), PTSD (Smith, Harms, et al., 2012), and drug use disorders (Freedman et al., 2006; Lin, Vahabzadeh, Mezghanni, Epstein, & Preston, 2005), as well as nicotine dependence, anxiety symptoms, and eating disorder symptoms (Heron & Smyth, 2010). Handheld devices have also been used in research studies to evaluate symptoms among people with major depression or BPD (aan het Rot, Hogenelst, & Schoevers, 2012; Santangelo, Bohus, & Ebner-Priemer, 2014).

Ecological momentary assessment may be more effective for some clients than others. A French study involving 109 clients of an outpatient substance use disorder treatment program found that individuals in treatment for cannabis use disorders were significantly less likely than those in treatment for alcohol, opioid, or tobacco use to agree to participate in such an assessment and were less likely to respond to requests for information after agreeing (Serre et al., 2012). Individuals with tobacco dependence had the highest rate of participation and compliance. Another study comparing daily mood assessment using a mobile phone application with the assessment using paper and pencil (*N*=40) for individuals with BPD found significantly worse compliance and significantly greater variability among individuals who used the application than among those who used a more traditional method, suggesting some potential problems using the technology with that population (Depp, Kim, de Dios, Wang, & Ceglowski, 2012). However, the authors also found greater agreement between self-assessments reported using the mobile phones and clinicians' rating of depression and manic symptoms than with those reported using paper and pencil, suggesting that there was also a potential benefit to the phone-based method.

Use in Treatment of Anxiety Disorders

A variety of computerized and phone-delivered interventions have been developed to aid in the treatment of anxiety disorders, and in general, they have been found effective in reducing anxiety and superior to waitlist controls or placebos, with some studies indicating a level of effectiveness

comparable with therapist-delivered treatment (Andersson, 2009; Cuijpers, Donker, van Straten, Li, & Andersson, 2010; Furmark et al., 2009; Griffiths, Farrer, & Christensen, 2010; Morgan & Jorm, 2009; Newman et al., 2010; Newman et al., 2011a; Reger & Gahm, 2009). A meta-analytic review on the use of computers in therapy for anxiety disorders by Cuijpers et al. (2009) found that such interventions did not differ significantly in effectiveness from in-person interventions according to a number of different comparisons, but they also noted that other factors relating to differences in the studies could have affected this finding.

Newman and colleagues (2010), in their review of the research on computer/Web-delivered interventions for anxiety disorders, also noted that there are good data supporting the use of such interventions for treating panic disorder and SAD/social phobia, and fewer, but also good, studies indicating that computerized interventions (in the form of VRET) helped in the treatment of some specific phobias (particularly fear of flying and acrophobia, but not spider phobia). Also, some limited research has found computerized interventions useful for PTSD and GAD, but not enough data are available to make recommendations for the treatment of those disorders. For treating OCD, data indicate that computerized interventions may be useful if integrated with some therapist contact, but not as stand-alone treatments.

A review by Newman, Szkodny, Llera, & Przeworski (2011b) summarized a larger group of research findings regarding the use of computer interventions that require little or no therapist contact. Specifically, the authors concluded that there was good evidence supporting the use of computerized interventions for mixed anxiety disorders, panic disorder, and SAD. For panic disorder, the best strategy appeared to be a combination of minimal therapist contact (as little as 150 minutes for a course of treatment) and Web-based or computer-based treatment, which could be enhanced by also including a stress management component. In the case of SAD, predominantly self-guided computerized interventions focusing on attention retraining and exposure appear to be effective if delivered in a clinical setting, but some minimal level of therapist contact is probably needed for therapy delivered in the client's home. Although some evidence supported the effectiveness of computerized interventions for GAD, OCD, and PTSD, the authors cautioned that more thorough research on the utility of such approaches is needed.

In the treatment of simple phobias, Web-delivered or computer-delivered interventions (usually using VR hardware and software) show promise as treatments for claustrophobia, driving phobia, flying phobia, and spider phobia, but more research is needed, as studies to date have had significant flaws (Newman et al., 2011b). Newman and colleagues (2011b) cautioned, however, that the research also indicates a greater problem with compliance for clients who use these technologies with little or no contact. They also noted that many of the studies they reviewed had serious methodological problems, including a lack of follow-up assessments, small sample sizes, a failure to compare computerized treatments with other active treatments as well as with no-treatment control groups, a tendency to evaluate changes in symptom levels but not clinically significant changes (i.e., whether the individual obtains remission from the disorder), a failure to provide sufficient information about the hardware and software used, and a failure to use a diverse (culturally and in other ways) population of participants.

Another review by Reger and Gahm (2009) of 19 studies of computerized interventions for anxiety (including both those that did and those that did not use the Internet) also found support for their use; such interventions were superior to no-treatment or placebo controls for treating

panic disorder and specific phobias, and limited data suggested that they were more effective than no treatment or placebo for PTSD. In addition, computerized interventions for panic disorder appeared to be as effective as treatment as usual involving CBT delivered in person. These interventions also appeared to be as effective for subclinical anxiety symptoms as they were for treating anxiety disorders (for more information on this topic, see the forthcoming TIP, *Managing Anxiety Symptoms in Behavioral Health Services* [SAMHSA, planned a]). A number of phone and Web interventions for treating anxiety symptoms and/or anxiety disorders fall into the category of self-guided interventions (in which case, a staff person, either in person or by telephone, guides the client in the use of a computer program or printed materials; Morgan & Jorm, 2009). A review by Cuijpers et al. (2010) found that self-guided interventions (involving interventions that typically made use of phone contact with a therapist) were at least as effective, and possibly slightly more effective, than therapist-delivered treatment for panic disorder, social phobia, and specific phobias.

Research suggests that clients receiving online treatment for anxiety are able to establish relationships with counselors that are as stable and positive as those found in treatment provided in person, but the quality of the working alliance between client and counselor may have less effect on clients receiving Web-based treatment (Knaevelsrud & Maercker, 2006). However, depending on the type of anxiety disorder being treated and client characteristics, it may be preferable to have at least some counselor contact (Newman et al., 2011a). Research involving palmtop computers in the treatment of both GAD and panic disorder has indicated that using such technology reduces costs compared with standard, in-person CBT (Newman, Kenardy, Herman, & Taylor, 1997; Newman, Consoli, & Taylor, 1999; Newman et al., 2010). The sections that follow discuss some specific approaches to treating anxiety that can be delivered using phone or computer technology and how such technology can be used to treat specific anxiety disorders. Studies are included if they were not included in the reviews discussed previously or if they had results that warranted particular attention.

CBT

Most of the interventions available for treating anxiety via computer use CBT techniques that have been found effective at reducing anxiety/treating anxiety disorders in other settings and that typically adapt well to computer delivery (Newman et al., 2010). Reviews that focus on Web- and computer-based CBT interventions for anxiety have found them to be superior to control conditions. Griffiths et al. (2010) reviewed randomized controlled trials of Web-based CBT interventions and determined that, with one exception, these interventions were associated with better outcomes than no-treatment control groups in at least one area evaluated. For interventions treating panic disorder or SAD/social phobia, effect sizes were comparable with those seen in studies of interventions delivered in person. However, the authors cautioned that in many of the studies evaluated, self-selected participants were used. A major focus of Andersson's (2009) article on Web-delivered CBT is the use of such techniques for anxiety disorders. He also found good evidence to support the use of such interventions for panic disorder and SAD and promising evidence supporting their use to treat PTSD.

GAD

Researchers in Australia developed and evaluated a Web-based CBT treatment for GAD (the Worry programme; Titov, Andrews, Robinson, et al., 2009). They randomly assigned 48 individuals to treatment or to a no-treatment control group and assessed them after the 9 weeks

required for the delivery of the intervention (an assessment completed by 20 individuals in the treatment group and 19 in the control group). At the conclusion of treatment, participants who received the intervention had significantly lower symptoms of worry (as measured by both the Generalized Anxiety Disorder–7 Item Scale and the Penn State Worry Questionnaire) and symptoms of depression (according to the PHQ-9) than did those in the control group. Individuals with GAD (N=29) who used an attentional bias modification software program experienced significant reductions in anxiety and anxiety symptoms, according to both the State and Trait measures from the Spielberger State–Trait Anxiety Inventory, the SCID-IV Anxiety Disorders Module, the Worry Domains Questionnaire, and the Penn State Worry Questionnaire (Amir, Beard, Burns, & Bomyea, 2009).

Social anxiety disorder/social phobia

Populations who might otherwise avoid contact with others, such as people with SAD (Andersson, 2009; Erwin, Turk, Heimberg, Fresco, & Hantula, 2004) or high levels of agoraphobic avoidance (Andersson et al., 2008), may be more comfortable seeking treatment over the Internet than in person. Thus, Web-based interventions may be especially promising for treating SAD. Andersson (2009) reviewed studies by three groups of researchers of Web-based treatments for SAD that use CBT principles and therapist guidance. All three have had positive results. He noted that although some may believe that Web-based therapy is not appropriate for people with this disorder, the fact that people with SAD are extensive users of the Internet, combined with the ability of these approaches to make them more comfortable in the early stages of treatment, suggests that they may provide effective treatment for clients who would not otherwise seek it.

Research on Web-based treatments for SAD includes a 30-month follow-up on a Swedish study included in Andersson's (2009) review, in which 77.2 percent of the original 57 participants were contacted for a follow-up interview (Carlbring, Nordgren, Furmark, & Andersson, 2009). At the 30-month follow-up, the authors found that significant improvements in all primary measures observed at the conclusion of the intervention continued with large effect sizes for those measures. In another Swedish study, Furmark et al. (2009) conducted two trials of a Web-based CBT treatment for SAD, comparing it with three different groups: bibliotherapy with online participant discussions, a waiting list, and (in the second trial only) Web-delivered applied relaxation training. Both the online CBT and the bibliotherapy were associated with significantly better outcomes in terms of social anxiety symptoms, general anxiety symptoms, depression, and quality of life compared with the waitlist control. Improvements in those areas continued at a 1-year posttreatment assessment. Effect sizes were somewhat larger for online CBT than for bibliotherapy and were comparable with those found in trials of online CBT with additional support from therapists, leading the researchers to conclude that feedback from therapists was not necessary for the interventions to be effective.

In a Swiss study, Berger, Hohl, and Caspar (2009) evaluated a Web-delivered treatment for SAD using a sample of 53 individuals randomly assigned to the treatment or to a waitlist control group. They found that significant improvements occurred more often with intervention participants (58 percent) than with individuals in the control group (20 percent). Titov, Andrews, Choi, et al. (2009) found that individuals with social phobia disorder had significantly better compliance with treatment and better outcomes when using a Web-based CBT treatment if they also received weekly phone calls from a physician than if they only received automated email

messages. However, in another study of Web-based CBT treatment for social phobia disorder, Titov, Andrews, Schwenke, et al. (2009) compared outcomes for those who, in addition to the online treatment, received weekly phone calls from a research assistant with those who were given the opportunity to participate in an ongoing, therapist-monitored discussion group. Both groups had comparable effect sizes with respect to reductions in social phobia symptoms on multiple measures, with effect sizes being somewhat (but not significantly) larger across measures for the Internet forum group. The time spent by staff members was also similar for the two groups (38 minutes per participant for the phone contact and 37 minutes per participant for the Internet forum).

An Australian study (Andrews et al., 2011) that compared Web-delivered CBT for SAD with CBT delivered in person also found no significant differences in social anxiety outcomes (both interventions achieved similar improvements), but it did find that substantially fewer clinician hours were required for the Web-based intervention (an average of 18 minutes per client) than for the intervention provided in person (an average of 240 minutes per client). In another European trial of Web-delivered CBT (Berger, Caspar, et al., 2011), 81 individuals with SAD were randomly assigned to receive a self-guided intervention alone, the intervention with additional email support from a therapist, or a self-guided intervention with optional email and/or telephone support according to client demand. These researchers found significant symptom reductions for all three treatment arms, but there were no significant differences among the groups in terms of social anxiety symptom levels, remission from SAD, dropout rates, treatment compliance, or the probability of clinically significant change.

Some research has found that cognitive bias modification software (which is intended to change users' cognitive biases, as discussed more fully in the "Interventions To Reduce Trait Anxiety and Subclinical Anxiety Symptoms" section) shows promise as a treatment for SAD, but other studies have failed to replicate these findings (Emmelkamp, 2012). For example, a small (N=36) study of a cognitive bias modification program for SAD did find significantly greater reductions in trait anxiety and social anxiety symptoms in the treatment group than in a placebo control at the time of a 4-month follow-up assessment, with 72 percent of those in the treatment group no longer meeting criteria for SAD at the conclusion of the treatment compared with 11 percent of those in the control group (Schmidt, Richey, Buckner, & Timpano, 2009). Beard, Weisberg, and Amir (2011), in a small (N=32) randomized controlled study, compared individuals receiving another computerized bias modification intervention for treating SAD (Attention and Interpretation Modification for SAD) with a group who used a similar software program without the same therapeutic content. Compared with those in the control group, participants who received the intervention had significantly greater reductions in social anxiety symptoms and performed better on a behavioral task intended to evaluate their level of social anxiety.

However, one study was unable to find any significant improvements associated with a cognitive bias modification intervention for SAD (Julian, Beard, Schmidt, Powers, & Smits, 2012), and another found no additional benefit in adding cognitive bias modification to standard CBT (McEvoy & Perini, 2009). Based on a review of this literature, Emmelkamp (2012) concluded that although cognitive bias modification software may be effective at treating subclinical SAD symptoms, there are more effective computerized interventions already available for SAD.

Research suggests that Web-based interventions are a cost-effective means of treating individuals with SAD. One Swedish study compared cost-effectiveness for a Web-based CBT treatment for SAD with a similar CBT intervention delivered in groups and found that, although both were about equally effective in reducing social anxiety symptoms, costs were significantly lower for the Web intervention (Hedman et al., 2011).

Panic disorder

Researchers in the Netherlands evaluated 3-year outcomes for clients who received a Web-based CBT treatment for panic symptoms, which included computerized homework assignments and individualized therapist feedback (Ruwaard, Broeksteeg, Schrieken, Emmelkamp, & Lange, 2010). Individuals who had chronic panic attacks were randomly assigned to a treatment group (n=27) or to a waitlist control group (n=31), and the authors used an intent-to-treat analysis to evaluate outcomes. Following treatment, participants who received the intervention had significantly better outcomes in a number of areas, including panic attack intensity (rated on a 10-item Likert scale; p<.001), panic disorder severity (Panic Disorder Severity Scale-Self Rate [PDSS-SR]; p<.027), anxiety symptoms (Depression Anxiety Stress Scales [DASS]; p<.023), depressive symptoms (DASS; p<.015), and past-week panic attack intensity (p<.005). Following this initial trial, waitlist participants also received the intervention, and results were pooled for the two groups in evaluating outcomes 3 years later. At that time, using data obtained prior to follow-up for missing individuals, the authors found that 68 percent of participants reported no panic attacks during the prior week; 83 percent had PDSS-SR scores that did not indicate a current panic disorder.

In an Australian study of a Web-delivered intervention, researchers randomly assigned individuals who had panic disorder with agoraphobia to an online CBT intervention group (n=32) or to a waitlist control group (n=27; Wims, Titov, Andrews, & Choi, 2010). In each group, 22 individuals completed the posttreatment assessment, and 21 in the intervention group completed an assessment 1 month later. The researchers found that participants who received the intervention, compared with those in the control group, had significantly lower panic symptoms as measured by the PDSS-SR, the Body Sensation Questionnaire, and the Agoraphobic Cognitions Questionnaire. Also, panic attacks declined for participants in the intervention group from a mean of 8.03 in the prior 4 weeks at the start of treatment to 3.72 at the end of treatment and 2.76 at the 1-month posttreatment assessment (by comparison, the number of attacks for those in the control group rose from 5.84 to 8.20 at the first assessment and 8.6 at the second). The effect sizes for the intervention were comparable with those seen in other online CBT treatments and some in-person CBT treatments for panic disorder.

In an earlier Australian study, Kiropoulos et al. (2008) randomly assigned 86 individuals with panic disorder (some with and some without agoraphobia) to receive either a Web-based CBT treatment (Panic Online) or standard, best-practice CBT for panic disorder delivered in person. They found both interventions to be about equally effective, and participants in both groups showed significant improvements in terms of therapist-rated panic disorder severity; self-reported panic severity; frequency of panic attacks; anxiety, depression, and stress (measured with the DASS); and quality of life (World Health Organization Quality of Life-Brief). Participants who received in-person treatment did find greater enjoyment in their therapeutic interactions, and their therapists gave them higher ratings for treatment compliance and understanding. However, the online treatment required significantly less time from therapists.

Yet another study of Web-based CBT for panic disorder (*N*=55), conducted in Australia by Klein, Richards, and Austin (2006), compared a Web-based intervention that featured limited email contact with a printed CBT self-guided manual combined with phone contact with a therapist; they found no significant differences in terms of improvements in self-rated physical health and decreases in panic disorder symptoms, panic-related thought, and negative affect. However, the Web-based intervention was associated with better outcomes in terms of agoraphobia (as rated by staff people), and both interventions were superior in all outcomes compared with an information-only control group. As noted previously, other research from this group did not find any significant benefit in increasing the frequency of therapist email contact from once a week to three times a week when using Web-based CBT for panic disorder (Klein et al., 2010).

Carlbring and colleagues (2005) studied an intervention providing Web-based CBT with minimal therapist email contact and compared it with in-person CBT in a group of 49 clients with panic disorder and found the two about equally effective. In a reanalysis of data from this earlier study, Andersson and colleagues (2008) determined that individuals with high levels of agoraphobic avoidance (on the Agoraphobic Cognitions Questionnaire) had significantly better outcomes in Web-based treatment than when receiving in-person treatment. The authors suggested that this is likely because in the early phases of treatment, the use of the Internet helped these clients overcome resistance to help-seeking and/or leaving home for appointments, but they noted that in later phases, both treatment conditions exposed individuals to anxiety-provoking situations. They also found that individuals with co-occurring personality disorders fared better with in-person treatment than Internet-delivered treatment.

PTSD

Amstadter, Bromon-Fulks, Zinzow, Ruggiero, and Cercone (2009) reviewed research concerning Web-based interventions for problems that can stem from trauma exposure, including subdiagnostic levels of PTSD symptoms, substance use disorders, and depression. However, only four of the interventions they reviewed specifically treated PTSD symptoms. They concluded that, although the results of these studies are promising, more research is needed. Another review by McLean et al. (2010) was more thorough in its consideration of technology as useful in the treatment of PTSD, and it addressed such issues as the use of VRET in addition to Web- and computer-based interventions. These authors observed that such interventions have been found to be associated with significantly better outcomes than waitlist controls or supportive therapy, but they were unable to identify any studies that compared in-person and computerized CBT intervention for PTSD. They concluded that computer technology can increase access to care for people with PTSD by bridging geographical distances, making care available for people who would otherwise have to wait for open treatment slots, providing cost-effective interventions that can reach people who do not have the economic resources or insurance coverage for care, and providing a greater sense of protection for clients who might prefer the more anonymous interactions of a computerized intervention. Additionally, they noted that computerized treatment elements can enhance and improve existing interventions (e.g., tailored psychoeducation, computerized self-monitoring, VRET).

Specific computer- and Web-delivered interventions for treating PTSD include the Interapy program available in Dutch, a CBT treatment that provides exposure therapy over computers with supervision from a therapist, which is included in the reviews discussed in the "Treatments

for Multiple Anxiety Disorders" section (Lange, van de Ven, & Schrieken, 2003). Early research found that participants who received the intervention had significantly greater reductions in trauma-related symptoms and improvements in mood and anxiety compared with individuals assigned to a waitlist-only control group (Lange, Rietdijk et al., 2003). More recent reports appear to confirm the utility of the intervention in reducing PTSD symptoms and improving functioning, but those studies are only available in Dutch.

Another partially computerized CBT treatment for PTSD, which is being used by VA and the U.S. military, is the Delivery of Self-Training and Education for Stressful Situations (DE-STRESS) intervention (which also makes use of some in-person or telephone interviews). This intervention is also included in the previously cited reviews. The intervention teaches clients techniques to help them cope with situations that bring on recall of traumatic events and to assist them in managing negative affect (Litz, Engel, Bryant, & Papa, 2007). In a research trial, DE-STRESS (n=24) was compared with another Web-based intervention that used supportive counseling (n=21); among treatment completers (about 30 percent of participants dropped out from both treatment arms), those who used DE-STRESS had, at a 6-month follow-up assessment, significantly lower anxiety (measured with the Beck Anxiety Inventory [BAI]), depression (measured with the BDI), and PTSD symptoms (using the PTSD Symptom Scale–Interview Version), and they were significantly less likely to meet clinical criteria for a PTSD diagnosis (Litz et al., 2007).

Klein et al. (2010) conducted an evaluation of an online CBT treatment for PTSD in Australia with 22 clients who had PTSD and were assessed at baseline, immediately after treatment, and 3 months after treatment. Treatment consisted of a 12-week psychoeducational intervention provided online with support from a trained therapist. The authors found that, at the 3-month assessment, 77 percent of participants no longer met diagnostic criteria for PTSD. The majority (69 percent) of participants rated the intervention positively, and the average therapist time required per client was relatively low (194.5 minutes).

In another Australian study, individuals with PTSD were randomly assigned to either a waitlist control group (n=21) or to a group using a Web-based PTSD treatment (n=23), which included a therapist-moderated online discussion forum, automatic reminder emails, and instant messaging chats with a therapist, with a mean therapist time of 104 minutes per client (Spence et al., 2011). Using an intent-to-treat analysis, the authors found that those who received the intervention had significantly lower levels of PTSD, depressive, and GAD symptoms following treatment than did members of the control group, but no significant differences were found in terms of psychosocial impairment (as measured with the Sheehan Disability Scale). Another study of a Web-based PTSD treatment conducted with German-speaking clients (N=34) provided data from a 1.5-year follow-up period (Knaevelsrud & Maercker, 2010). The authors found that significant reductions in intrusion, avoidance, and hyperarousal PTSD symptoms (evaluated using the Impact of Event Scale) measured at the end of treatment were maintained at the 1.5-year follow-up, as were significant reductions in anxiety and depression symptoms (evaluated with the SCL-90-R).

Possemato, Ouimette, and Knowlton (2011) conducted a pilot study of a brief, self-directed, Web-based intervention (written emotional disclosure [WED]) with 31 combat veterans who had screened as likely having PTSD. Participants were randomly assigned to use the intervention or to a control condition that used a Web page to discuss time management. Both intervention and

control conditions involved written text and took place in three 20-minute sessions. There were no significant differences between the two groups in terms of reductions in PTSD symptoms, but the authors observed that participants who expressed more emotional content and thoughts related to their traumatic experiences were significantly more likely to have decreases in PTSD symptoms if they used the WED intervention.

McLean and colleagues (2010) and Gerardi et al. (2010) both reviewed research on VRET for treating PTSD and noted that case studies, nonrandomized studies, and one small randomized controlled trial suggest that this is a useful method for delivering exposure therapy. VRET, which uses computers and special equipment to create a three-dimensional simulation of the world, was originally used to assist in the treatment of specific phobias (Rothbaum, Rizzo, & Difede, 2010). In addition to providing audio and visual content, new innovations in VRET allow for the addition of olfactory and tactile stimuli (Rizzo, Rothbaum, & Graap, 2007). Developers have created specific programs to simulate environments in which trauma may have originally occurred, including the Vietnam War, the Iraq and Afghanistan Wars, the World Trade Center attack, terrorist bus attacks in Israel, and the Portuguese colonial wars in Africa (Rothbaum et al., 2010).

As an example of VRET research, Difede, Cukor, Patt, Giosan, and Hoffman (2006) compared outcomes for nine individuals who used a VRET program that simulated the attack on the World Trade Center and eight who were on a waitlist for treatment. Most participants were disaster relief workers, and all had experienced trauma as a result of the attack; six of the nine who used VRET had failed to have a response to exposure therapy in prior treatment attempts. They found that those who received the intervention had significant decreases in PTSD symptoms (measured with the Clinician-Administered PTSD Scale), and five participants no longer met criteria for PTSD at the end of treatment, whereas individuals in the control group had no significant decreases in PTSD symptoms, and all were still diagnosed with PTSD.

Preliminary data on the first 20 treatment completers of the Virtual Iraq VRET program also suggest that it is an effective intervention (Rizzo et al., 2010). Participants had significant decreases in PTSD symptoms (as measured with the PTSD Checklist–Military Version), and 16 of the 20 no longer met diagnostic criteria for PTSD at the conclusion of treatment. An evaluation of VRET for 24 active-duty soldiers who had been deployed to either Iraq or Afghanistan also found significant decreases in PTSD symptoms following its use, with 62 percent (n=15) experiencing at least an 11-point decrease in PTSD Checklist–Military Version scores (Reger et al., 2011). A Spanish study also evaluated a VR CBT intervention for PTSD as well as other stress-related disorders (i.e., adjustment disorder, pathological grief) with a group of 39 clients (10 with PTSD) and found the intervention to be as effective as CBT delivered in person (Baños et al., 2011).

Advantages of VRET over other forms of exposure therapy include the therapist's ability to share the experience of the trauma with the client, the ability to recreate traumatic experiences that would be too difficult and/or costly to do in real life, the ability to subtly adjust the client's experience, and the ability to recreate a more realistic simulation (Rothbaum et al., 2010). Potential disadvantages of the technology include the possibility of hardware or software malfunctions that could interrupt the therapy, the expense involved in creating a specific simulated environment, and the possibility that some clients may be distracted by the technology

instead of focusing on the experience it presents (Rothbaum et al., 2010). See Part 1, Chapter 1 of this TIP for more information on VR.

Telephone-delivered CBT has been used successfully to treat PTSD symptoms and reduce psychological distress among people who have undergone a potentially traumatizing medical procedure (hematopoietic stem-cell transplantation), although individuals did not necessarily meet criteria for a PTSD diagnosis (DuHamel et al., 2010). Participants in the study (N=89) received either 10 sessions of phone-delivered CBT or assessment only; compared with the control group, those who received the intervention reported significantly fewer PTSD symptoms as well as fewer symptoms of depression, even after controlling for demographic and medical factors. These benefits persisted at a final follow-up assessment 1 year after the study began. For information on PTSD Coach, a smartphone app for veterans developed by VA's National Center for PTSD and DoD's National Center for Telehealth and Technology, see Part 1, Chapter 1 of this TIP.

PTSD treatment can also be delivered using video conferencing. In a Canadian study, 16 clients with PTSD receiving CBT via video conferencing were compared with 32 clients who were treated in person (Germain, Marchand, Bouchard, Drouin, & Guay, 2009). Both groups experienced significant improvements in PTSD symptoms and overall functioning, and no significant differences in these outcomes were observed between the groups. In a nonrandomized study, Gros, Yoder, Tuerk, Lozano, and Acierno (2011) evaluated exposure therapy for PTSD delivered using video conferencing. They compared outcomes for 62 veterans with PTSD who received exposure therapy using video conferencing and 27 who received it in person. Despite both groups experiencing significant reductions in measures of PTSD symptoms (PTSD Checklist–Military) and symptoms of depression (BDI) following treatment, those who received treatment in person had significantly greater reductions, after controlling for pretreatment scores, than did those who used video conferencing. However, the lack of random assignments may have skewed the authors' findings. The authors also noted that the effect sizes for reductions in symptoms among those who used video conferencing were comparable with those typically reported for exposure therapy, whereas the effect sizes for those who received treatment in person were more robust than had been expected.

OCD

A few different computer- and phone-assisted interventions have been developed for treating OCD and are reviewed by Moritz, Wittekind, Hauschildt, and Timpano (2011). These authors briefly described interventions with published literature that have been found effective at reducing OCD symptoms or otherwise assisting in OCD treatment (e.g., by reducing the required length of time for traditional treatments). The interventions included in the review make use of a variety of approaches and include a VR software program (Kirkby et al., 2000); a Web-based CBT treatment for hoarding behaviors (Muroff, Steketee, Himle, & Frost, 2010); and a behavioral intervention, known originally as BT Steps and more recently as OCFighter, that makes use of computer and phone technology (Bachofen et al., 1999; Greist et al., 2002; Kenwright et al., 2005; Marks et al., 1998). They also described an evaluation of a program for children and adolescents with OCD that uses Web cams to deliver treatment over the Internet. Of the programs intended for adults that are included in the review, BT Steps is the only one to have been evaluated in a randomized controlled study, which found it superior to relaxation training but inferior to therapist-guided behavioral therapy (Greist et al., 2002). Another study of BT

Steps found a therapist-guided version to be superior to a version that relied solely on client motivation to initiate therapist contact (Kenwright et al., 2005).

A review by Lack & Storch (2008) also found computer-based interventions effective in both assessment and treatment of OCD. Lovell and Bee (2011) conducted another review of TAC for OCD. They discussed most of the same studies cited in this section and also provided more. Included in their review are five studies of computerized CBT (four of which involve the BT Steps/OCFighter program), two studies of interventions using telephones to deliver CBT, one study using video conferencing (for youth), and five studies of bibliotherapy.

Herbst et al. (2012) conducted a review of research involving the use of phone and computer technology to assist in treating OCD. They reviewed 17 studies using telephone and computer technology (15 of which were for adults). Based on their review, they concluded that these interventions were effective at reducing OCD symptom severity and had effect sizes comparable with in-person interventions. They observed that dropout rates were relatively high for these interventions, but BT Steps was able to lower dropout rates and increase effect sizes by introducing therapist-initiated phone contacts with clients. Computerized interventions, in particular, may reach clients who would not otherwise seek treatment, often because of a high degree of shame (a major barrier to treatment for people with OCD). They also observed that studies typically excluded participants with certain co-occurring disorders (e.g., major depression) and therefore these interventions may not be effective for those individuals. Some of the studies reviewed did find smaller effect sizes for clients with hoarding symptoms; these interventions may not be optimal for them.

Treatments for multiple anxiety disorders

Although most computer/Internet interventions are designed to treat a specific anxiety disorder, a few programs are available that can treat multiple anxiety disorders, and in some cases, depression or other mental disorders as well. For example, in Australia, Titov, Andrews, Johnston, Robinson, and Spence (2010) developed and evaluated a Web-based CBT intervention for anxiety symptoms and disorders, the Anxiety Program, which involved online lessons, homework assignments, an online discussion forum, and weekly email or phone contact from a therapist. They evaluated the intervention with individuals who had diagnoses of GAD, panic disorder, and/or social phobia. Participants were randomly assigned to the intervention (n=42) or to a waitlist control group (n=44). At a 3-month follow-up assessment, 32 individuals from the treatment group and 36 from the control group were available; those who received the intervention had significantly lower anxiety symptoms as measured by the Generalized Anxiety Disorder–7 Item Scale, the Social Phobia Screening Questionnaire, and the PDSS-SR, although they were not significantly lower on the Penn State Worry Questionnaire. At the end of treatment, 40 percent of those who received the intervention were in remission from their anxiety disorders compared with 8 percent of those in the control group.

More recently, the Anxiety Program was expanded to address depression as well as anxiety disorders and was retitled the Wellbeing Program (Titov et al., 2011). In an initial evaluation, 77 participants with diagnoses of panic disorder, GAD, SAD, and/or major depression were randomly assigned to an intervention group that used the program or to a waitlist control group. A relatively high number of those who received the intervention (81 percent) completed all treatment modules, and participants reported a high level of satisfaction with the program.

Therapists spent a mean of 87.6 minutes per client. At the conclusion of treatment, participants who used the Wellbeing Program had significantly lower levels of both anxiety and depression symptoms than did those in the control group. At a 3-month posttreatment follow-up assessment, 62 percent of those who used the intervention no longer met diagnostic criteria for their primary disorder, and 54 percent no longer met criteria for any of the four disorders treated by the program. Dear et al. (2011) also evaluated a brief version of the Wellbeing Program that presented material in five sessions rather than the eight originally required. This version of the program was also very well-received by participants, who showed improvements in anxiety and depression that were of a similar magnitude to those seen in evaluations of the full program, and the mean amount of time per client spent by therapists for the entire intervention was reduced to 44.6 minutes.

In Sweden, Carlbring et al. (2011) evaluated yet another Web-based treatment for multiple anxiety disorders (i.e., SAD, GAD, panic disorder) that included personalized feedback and guidance from a therapist. The authors randomly assigned 54 participants to the intervention or to a control group that required participation in an online moderated discussion group. At the end of treatment, participants who used the program had significantly greater reductions in measures of anxiety and depressive symptoms and significantly greater improvements in quality of life compared with those in the control group. At a 1-year follow-up assessment, differences in depressive symptoms and quality of life remained significant, but at a 2-year follow-up assessment, no significant differences between the groups remained.

Ruwaard, Lange, Schrieken, and Emmelkamp (2011) reported on multiple trials conducted in the Netherlands of a Web-based CBT intervention (Interapy) that uses asynchronous text messages from therapists (similar to email exchanges) to treat a variety of mental disorders, symptoms, and related problems. Although the review includes one study each involving people with bulimic symptoms and depression, the majority of studies involved people with anxiety disorder symptoms (i.e., panic disorder, PTSD symptoms) or general anxiety/stress. Using an intent-to-treat analysis, the authors found that, across multiple trials (with a combined N=840), Interapy was associated with significantly larger reductions in primary symptom measures than were controls, and effect sizes for the treatment were comparable with those observed for CBT interventions delivered in person. Interapy was also well-received by clients, and 82 percent of participants in these trials completed treatment, which ran from 5 to 16 weeks depending on the disorder addressed and other factors. Also, 79 percent of participants completed all follow-up assessments conducted from 1 to 3 years after treatment.

Another group of Australian researchers evaluated Anxiety Online, a fully automated, free, Web-based intervention intended to assess and treat a variety of anxiety disorders (Klein, Meyer, Austin, & Kyrios, 2011). Participants were diagnosed by the program with GAD (n=88), SAD (n=50), panic disorder (n=40), PTSD (n=30), or OCD (n=17) and completed the online program and a reassessment 12 weeks after completion. At the follow-up assessment, the researchers found significant reductions in disorder severity across all five disorders and significant decreases in the number of participants meeting diagnostic criteria for all of the disorders except panic disorder (for which there was a decrease in the number, but not a significant one). For participants with GAD, SAD, OCD, and PTSD, the authors also found significant improvements in quality of life; for those with GAD, PTSD, or panic disorder, they also found significant reductions in general psychological distress.

Another well-evaluated computerized intervention available to treat a number of different anxiety disorders is the Coordinated Anxiety Learning and Management (CALM) program. CALM uses computers to deliver CBT to treat panic disorder, SAD, GAD, and/or PTSD for patients in a collaborative primary care setting (Craske et al., 2009; Roy-Byrne et al., 2010; Sullivan et al., 2007). Although the intervention includes in-person contact with an anxiety clinical specialist (usually a nurse or social worker) as well as the patient's primary care doctor, a large component is the computer-delivered CBT program, which guides both patients and providers (Craske et al., 2009). At a follow-up assessment 18 months after treatment, the CALM intervention was associated with significantly greater improvements in global anxiety symptoms (as measured by the Brief Symptom Inventory-12) and significantly higher rates of remission from anxiety disorders compared with standard primary care treatment for anxiety disorders (Roy-Byrne et al., 2010). The program has also been well-received by both clinicians and patients (Craske et al., 2009). Research continues on CALM; for example, Wetherell et al. (2013) explored the difference in effects for younger versus older adults, but such research is outside the scope of this TIP, as the CALM research concentrates on CALM as a whole (e.g., in-person contacts, medications, computerized CBT), rather than on the technological innovations.

Interventions to reduce trait anxiety and subclinical anxiety symptoms

Computer software is available to train individuals with high levels of anxiety to either interpret ambiguous events in a more positive manner or focus their attention differently to reduce anxiety (typically measured as trait anxiety, but focused on specific anxiety disorder symptoms in some more recent studies). This is a process known as cognitive bias modification or interpretive bias modification (MacLeod & Mathews, 2012). In interpretive bias modification, the software uses imagery and/or verbal messages to help people imagine themselves in situations that might potentially provoke anxiety. These situations are first presented in an ambiguous manner but are then resolved in a positive manner, demonstrating that any assumed negative interpretation was wrong. Participants then answer a short multiple-choice question about the nature of the events. In programs that modify attentional bias, individuals are retrained to focus less attention on negative information and more on positive information, thus also affecting their interpretation of events. As noted previously, cognitive bias modification programs have been used to treat GAD and SAD, but their most common use has been to reduce trait anxiety and/or subclinical anxiety symptoms.

MacLeod and Mathews (2012) reviewed the theoretical basis for using cognitive bias modification to address anxiety and the research demonstrating its effectiveness in doing so. A number of small, controlled studies included in that review have found that users of interpretive bias modification software experienced significant reductions in trait and/or state anxiety, as well as improvements in other, more general measures of behavioral health (Mathews, Ridgeway, Cook, & Yiend, 2007; Salemink, van den Hout, & Kindt, 2009). This software has been successfully delivered via the Internet (MacLeod, Soong, Rutherford, & Campbell, 2007; Salemink et al., 2009) as well as on computers in research settings. MacLeod and Mathews (2012) also cited studies showing that this type of software can reduce subclinical levels of OCD symptoms (Najmi & Amir, 2010), social anxiety symptoms (Amir, Beard, Taylor et al., 2009; Amir, Weber, Beard, Bomyea, & Taylor, 2008; Beard et al., 2011; Schmidt et al., 2009), extreme worrying (Hazen, Vasey, & Schmidt, 2009), and GAD symptoms (Amir, Beard, Burns et al., 2009). However, research has not found these methods effective for treating specific phobias, where changes in attentional bias do not appear to be associated with reduction in fear (Reese, McNally, Najmi, & Amir, 2010; Van Bockstaele et al., 2011).

Use in Treatment of Mood Disorders

Although phone- and Web-based services can be used in the treatment of any mood disorder, all of the studies included in this section address major depression or depressive symptoms. A few programs addressing BPD are also discussed in the "Use in Continuing Care/Symptom Monitoring for Mental Illness" section.

Video conferencing interventions to treat depression

Video conferencing has been successfully used for some time to treat mood disorders, most often major depression (Backhaus et al., 2012). García-Lizana and Muñoz-Mayorga (2010a), however, found only four randomized controlled trials of video conferencing interventions for depression (and one of those was for children and adolescents). They observed that such approaches are promising but found that the research evidence is insufficient to make a conclusion regarding effectiveness.

Trials with different populations have found video conferencing to be an effective way to deliver treatment for depression. For example, in a VA study, Ruskin et al. (2004) randomly assigned 119 veterans with depressive disorders to receive in-person mental health services or similar treatment delivered via video conferencing technology. The authors found no significant differences in outcomes, with both groups experiencing significant improvements in depressive symptoms. There were also no differences between the groups in terms of dropout rates, participant satisfaction, medication compliance, or keeping scheduled appointments.

In a more recent study, Moreno, Chong, Dumbauld, Humke, and Byreddy (2012) compared treatment for depression delivered by a psychiatrist using video conferencing technology for 80 Latinos with depression with standard care delivered by a primary care physician for 87 similar individuals. Both groups experienced significant improvements in disability, quality of life, and depression symptoms (according to both self-report and independent clinical evaluations), but those receiving the video conferencing intervention experienced significantly greater improvements in all areas. The video conferencing intervention was delivered using standard, commercially available Web cams and computers.

Telephone-based therapies to treat depression

Some research suggests that telephone-based therapies can also effectively treat depression. Mohr et al. (2008) conducted a meta-analysis of 12 trials of telephone-based interventions that addressed depression and found that such interventions reduced symptoms of depression significantly more than did control conditions and were associated with significant reductions in those symptoms from baseline to posttreatment assessments (reductions comparable with those observed in many in-person treatment evaluations). They also found a much lower attrition rate (7.6 percent across all studies) than typically found in trials of interventions for depression delivered in person. However, many of the participants in the studies reviewed had other mental or substance use disorders or serious health problems that may have affected outcomes. Telephone-based CBT has also been used in conjunction with pharmacotherapy, and in a number of studies, its use has been associated with greater reductions in depressive symptoms as well as improved medication compliance (Leach & Christensen, 2006; Mohr et al., 2008).

A later study of a telephone-based CBT intervention (prior studies of which were included in the review by Mohr et al., 2008) conducted with 85 veterans did not find any significant differences in depression outcomes between those who received the intervention and those who received standard care from community-based outpatient clinics, although both groups improved (Mohr et al., 2011). The authors noted that the small sample size, the low level of participation in the study among those who were recruited, and the fact that this group may have had more severe depression than those treated in previous trials of this telephone-based intervention may have affected outcomes. Yet another study from the same researchers compared CBT for depression delivered by telephone with that delivered in person to a group of 325 primary care patients (Mohr et al., 2012). At the end of treatment, there were no significant differences in depressive symptoms between the intervention and control groups, with both showing significant improvements. Participants who received the telephone-delivered intervention were also significantly more likely to remain in treatment for the duration. However, at the 6-month follow-up, depressive symptoms were significantly lower for those who received in-person services, although they remained significantly lower than at baseline for those in the telephone-administered CBT group.

Another recent trial of a telephone-based CBT intervention was conducted with 291 patients with diabetes who had elevated symptoms of depression indicated by BDI scores of 14 or greater (Piette et al., 2011). The authors found that the intervention added to treatment as usual was associated with significantly greater reductions in symptoms of depression than was the addition of printed information about depression to standard treatment. The group who received the intervention had significantly better health outcomes and greater involvement in recommended exercise activities compared with the control group.

Another phone-based intervention not included in the previously cited review was conducted with 604 employees covered by a managed behavioral health plan who had previously been screened as potentially suffering from depression (Wang et al., 2007). Participants were randomly assigned to receive either standard care alone (consisting of referral and information about services covered by their health plan) or standard care with the addition of care management provided by phone and eight sessions of phone-based CBT. At assessments conducted 6 and 12 months after the study began, participants who received the phone-based services, compared with those in the control group, had significantly lower level of depressive symptoms (according to the Quick Inventory of Depressive Symptomatology), were significantly more likely to have retained their jobs, and had spent significantly more hours working.

According to a Cochrane review by Dale, Caramlau, Lindenmeyer, and Williams (2008), peer support delivered by telephone has also been associated with significant decreases in depressive symptoms for women experiencing postnatal depression, as well as improvements in behaviors, such as getting health screenings and changing their diets. Computerized interventions for depression have generally been found to be effective at reducing depressive symptoms, particularly if the computerized intervention is supported by a clinical professional who is also working with the client (Andersson & Cuijpers, 2009; Griffiths & Christensen, 2007; Griffiths et al., 2010; Newman et al., 2011a). Research, although limited, also indicates that computer-based/Web-based interventions for depression are well-received by clients (Kaltenthaler et al., 2008).

Computerized interventions to treat depression

A meta-analysis of 12 computerized interventions for depression (10 of which were delivered over the Internet) found them to have a moderate effect size in relation to waitlist controls (Andersson & Cuijpers, 2009). However, when only those eight interventions that provided professional support in addition to the computerized intervention were considered, the effect size was significantly greater. Newman et al. (2011a) conducted another review of computerized interventions for depression that required little or no therapist involvement. They found that minimal or entirely self-guided interventions were of some benefit (greater than no treatment) to people with subclinical levels of depression, but many users of such programs do not complete treatment. They speculated that adding a motivational component delivered by a therapist could improve such treatment for people with subclinical depression. For people with major depression, the most effective intervention evaluated was one that involved minimal therapist contact (250 minutes for the entire treatment). The authors also cautioned about a number of methodological problems with studies they reviewed.

In the United Kingdom, Button, Wiles, Lewis, Peters, and Kessler (2012) evaluated factors associated with treatment response for 297 individuals with depression (according to the criteria provided in the International Statistical Classification of Diseases and Related Health Problems, tenth revision) who received Web-based CBT for depression. They found no significant effects relating to participant age, education, or history of prior treatment response. Of the factors included in their evaluation, only greater pretreatment severity of depression and being separated, widowed, or divorced were associated with significantly greater treatment response with the Web-based interventions than with the waitlist control group.

Specific Web-based programs to treat depression

A number of specific Web-based interventions have been developed to treat depression, most of which make use of CBT principles. For example, the Overcoming Depression on the Internet (ODIN) program is a self-guided CBT intervention in addition to standard care that, in an initial trial, was not found to be more effective than usual care alone. However, in a post hoc analysis, individuals with CES-D scores of 20 or less showed modest improvement (Clarke et al., 2002). Clarke et al. (2005) conducted a randomized controlled trial comparing ODIN, with the addition of reminders provided via either postcards or telephone calls, with treatment as usual. Participants who received either version of the intervention had greater reductions in depressive symptoms, especially for individuals who had CES-D scores of 28 or higher at the start of the study. Remission rates also appeared to be higher for those who received ODIN, as 20 percent more participants in the two intervention groups moved from the moderate or high levels of CES-D scores to the normal range than did participants in the control group.

De Graaf, Hollon, and Huibers (2010) compared a computerized CBT intervention for depression (Color Your Life) with treatment as usual, either by itself or in combination with the online intervention, for 303 individuals who had been previously screened as having mild to moderate levels of depressive symptoms according to the BDI-II. The researchers found no significant differences among treatment groups in terms of depression severity, remission to elevated symptoms following improvement, or rates of reliable improvement during the follow-up period. However, when they evaluated outcomes for participants who were considered extremely positive responders (i.e., who had scores on the Dysfunctional Attitudes Scale-Form A and the Questionnaire Without Questions that indicated higher levels of optimism), those who

had a high level of positive responding had significantly greater reductions in depressive symptoms if they received the online intervention than if they had treatment as usual. Also, participants who had a diagnosis of major depression or had parents with a mental disorder (typically associated with more severe psychopathology) had significantly better outcomes if they received the combined Web-based and standard treatments than if they received either one alone. According to another analysis of data from this study, participants who received the online intervention also made significantly less use of primary care services, specialized mental health services, and antidepressant medication during the first quarter following treatment, but those differences disappeared over time (de Graaf et al., 2011).

Another fully computerized intervention, Blues Begone, was designed to treat both depression and co-occurring anxiety. For this study, 100 individuals who were referred to the study by their primary care doctors used the program (which was provided on a CD-ROM), and 58 completed the program. Of program completers, 62 percent were found to have had clinically significant changes in BDI-II scores, and 45 percent had meaningful reductions in BAI scores (Purves, Bennett, & Wellman, 2009). Griffiths and Christensen (2007) reviewed a number of studies involving two Web-based interventions for depression, MoodGYM and BluePages, that were developed in Australia. Both programs demonstrated significantly greater reductions in symptoms of depression and anxiety than did no-treatment controls, and those effects continued for at least 1 year after treatment.

Mackinnon, Griffiths, and Christensen (2008) provided a 1-year follow-up evaluation of MoodGYM based on 60 percent of the 525 individuals who had been randomly assigned to use a Web site that provided psychoeducation about depression, to receive the online MoodGYM intervention, or to participate in a placebo control group. Both intervention groups had significant declines in depressive symptoms (measured with the CES-D), and those reductions in symptoms continued through the 1-year follow-up. Both intervention groups also had significantly greater reductions in symptoms than did participants in the control group, but there were no significant differences between the two interventions at the 1-year follow-up.

In yet another evaluation of MoodGYM, Farrer et al. (2011) compared 6-month follow-up outcomes for callers to an Australian counseling hotline who had high levels of psychological distress (i.e., scores of 22 or higher on the 10-item Kessler Psychological Distress Scale) and who received MoodGYM for depression (n=36), weekly telephone follow-up calls from a lay counselor (n=36), a combination of the two (n=41), or access to standard care only (n=35). Participants who received MoodGYM, either with or without the telephone component, had significantly lower levels of depression at follow-up than did participants in the other two groups, but there were no significant differences between the two MoodGYM groups in terms of compliance or outcomes.

In Germany, a Web-based CBT program to treat depression (Deprexis) was evaluated with a cohort of 320 individuals who received the intervention in addition to treatment as usual and 76 who received the intervention after a 9-week delay while receiving treatment as usual throughout the study period (Meyer et al., 2009). Participants who received the intervention immediately had significant improvements in depressive symptoms (measured with the BDI) and social functioning (according to the Work and Social Adjustment Scale), and these improvements continued to be maintained 6 months after the intervention ended.

In a later evaluation of Deprexis (improved over its prior form by the addition of email reminders and nonfinancial incentives), 210 participants were randomly assigned to receive one version of the intervention or to a waitlist control group (Moritz et al., 2012). At the conclusion of their treatment, participants who used Deprexis had, relative to those in the control group, significant improvements in symptoms of depression, dysfunctional attitudes, quality of life, and self-esteem. The largest improvements were observed among individuals who had baseline BDI scores between 19 and 29. The intervention had an 82 percent completion rate.

Another Web-based CBT intervention for depression is the Sadness program, which includes psychoeducation, online homework, an online discussion forum, and regular email contact with a therapist (Perini, Titov, & Andrews, 2009). This program was evaluated in Australia with 45 individuals who were randomly assigned to the intervention or to a waitlist control group. At the end of treatment, participants in the intervention group had significant decreases in depressive symptoms from baseline (as measured by both the BDI and the PHQ-9) and had significantly lower levels of symptoms than did participants in the control group. The intervention had effect sizes comparable with other Web-delivered interventions for depression that included therapist support; effect sizes were larger than those of interventions that did not have such support.

Titov, Andrews, Davies, et al. (2010) compared two versions of the Sadness program—one that was moderated by a psychiatrist (n=45) and included access to an online discussion forum and another that was moderated by a technician with no healthcare or counseling experience (n=41) with a waitlist control group (n=40). At the conclusion of treatment, participants in both Sadness interventions had significantly better outcomes according to the BDI-II and the PHQ-9 than did those who were in the control group, but there were no significant differences in outcomes from one another. However, at 4 months after treatment, participants in the technician-led group had further improvements in PHQ-9 scores and scores that were significantly better than those in the psychiatrist-led group. Completion rates were also good, with 80 percent of those in the technician-led group and 70 percent of those in the psychiatrist-led group completing all treatment sessions within the required time. The authors concluded that this intervention, which does require supportive messages from a staff person, can be conducted effectively by nonclinical staff members. In Great Britain, Kessler and colleagues (2009) randomly assigned 297 individuals with depression (indicated by BDI scores of 14 or more) to receive an online CBT intervention in addition to standard treatment or to receive standard treatment alone. Significantly more participants who received the online intervention (38 percent) had BDI scores of 10 or less (indicating remission from depression) at a 4-month assessment than participants in the control group (24 percent).

Comparing depression treatment programs

Dutch researchers compared two different approaches to Web-based treatment (Warmerdam, van Straten, Jongsma, Twisk, & Cuijpers, 2010). These authors randomly assigned 263 participants to a CBT online treatment (n=88), to a problem-solving therapy online treatment (n=88), or to a waitlist control group (n=87). At an 8-week posttreatment assessment, both treatment groups had, compared with the control group, larger reductions in depressive symptoms and significantly greater improvements in terms of dysfunctional attitudes, worry, negative problems orientation, and feelings of control. However, only participants in the problem-solving therapy group had significantly greater improvements relating to positive problem orientation and

avoidance behavior compared with the control group, suggesting somewhat better results than those achieved with CBT.

In a comparison study conducted in Sweden of treatments for major depression, 88 individuals who met the inclusion criteria and agreed to participate were randomly assigned to a guided self-treatment based on CBT principles delivered over the Internet, to a personalized treatment delivered by email, or to a waitlist control group (Vernmark et al., 2010). The self-guided intervention consisted of weekly modules and homework assignments. Standard CBT components were presented, and brief support was provided during the treatment. The other intervention group received email therapy that was tailored for each unique participant. Both groups had significant improvements in depressive symptoms at the end of the 8 weeks of treatment and at a 6-month follow-up assessment, but so did the control group. At the end of treatment, 34.5 percent of the self-guided group and 30 percent of the email group had BDI scores of less than 9, and at follow-up, the percentages of those with BDI scores below 9 increased to 47.4 percent for those in the self-guided group and 43.4 percent for those who received email therapy. The email therapy participants received an average of 8 treatment emails (with a range from 3 to 11); the authors noted that almost 10 times as much therapist time was required for the email therapy as for the guided Internet intervention.

Interventions for subclinical depression

A number of the trials of Web-based interventions for depression include individuals with a level of depressive symptoms that do not meet diagnostic criteria for a depressive disorder; thus, those interventions may be effective for individuals with subclinical depression. In their review of self-guided TAC interventions and minimal contact interventions for anxiety and mood disorders, Newman et al. (2011a) concluded that the research, although limited, indicated that these types of interventions were more effective in treating subclinical depression than in treating depressive disorders.

In a meta-analytic review of 12 randomized controlled trials of Web-based interventions for adults with symptoms of depression and/or anxiety, Spek et al. (2007) found that such interventions produced meaningful improvements, and they concluded that interventions with therapist support were especially effective. In an evaluation of their own Web-based randomized controlled trial of interventions for adults with subclinical depression (N=301), Spek, Cuijpers, et al. (2008) found that, 1 year after the interventions, 62 percent of the participants who had received eight Internet-based CBT intervention modules scored below 13 on the BDI, and 45 percent of those who had received 10 weekly group CBT sessions scored below 13. Of those in the waitlist control group, 38 percent had BDI scores below 13 at the 1-year follow-up. They also estimated that for every four clients with subthreshold depression who were treated with the Web-based intervention rather than being on a waitlist, one would have symptoms reduced below the cutoff level. Thus, not only was the outcome for the Internet-based CBT treatment adult group significantly better than for those adults in the waitlist group, but the results also demonstrated that meaningful reductions in the burden of depressive episodes can be achieved by reaching more individuals through Internet-based efforts.

More recently, Morgan, Jorm, and Mackinnon (2012) conducted a randomized controlled trial of an email-based treatment specifically for subclinical depression, which they also conceptualized as a prevention intervention for major depression. In the study, 1,326 individuals were randomly

assigned either to receive the automated email intervention, which provided advice on self-guided methods to reduce symptoms of depression, or to a control group, which received emails containing general information about depression. At the end of the study, participants who received the intervention had significantly lower levels of depressive symptoms, although the difference was not large.

Medication management interventions to treat depression

A few interventions are available that use phones or computers to help individuals with depression properly manage their medication. Simon, Ludman, Tutty, Operskalski, and Von Korff (2004) randomly assigned 600 individuals who had recently started on antidepressant medication as prescribed by a primary care doctor to receive usual primary care alone, primary care with coordinated phone-based care management intended to improve medication compliance, or usual primary care with coordinated phone-based care management and eight sessions of telephone-based CBT. Compared with those who received standard care alone, participants who received the CBT plus phone-based management had significantly lower levels of depressive symptoms (on the Hopkins Symptom Checklist Depression Scale [HSCL] and the PHQ-9), were significantly more likely to report that they felt their depression was "much improved," and were significantly more likely to indicate that they were "very satisfied" with their treatment 6 months into the study. Those who had received the coordinated care management and primary care were also significantly more likely than those in primary care alone to report feeling "much improved" and being "very satisfied," although not to the same degree as those in the more intense interventions with the added CBT. Both phone-based interventions also had a high participation rate (more than 90 percent).

Ludman, Simon, Tutty, and Von Korff (2007) evaluated a CBT plus care management intervention for 393 clients beginning antidepressant treatment with a primary care doctor. They were followed for 18 months and had significantly greater improvements in depression symptoms, with average HSCL scores in the treatment group being 0.68 (standard deviation [SD]=0.65) and in the usual care group being 0.85 (SD=0.55), and phone therapy clients were significantly more likely to report feeling "much improved" or "very much improved" at both 12 and 18 months (77.5 percent versus 63 percent), compared with the usual care group. Simon, Ralston et al. (2011) adapted telephone-based CBT care management for delivery via the Internet using text messages. They randomly assigned 208 individuals with a depressive disorder who had recently been prescribed antidepressant medication by a primary care doctor to receive the intervention in addition to standard care or to receive standard care only. At a follow-up assessment 5 months after the study began, participants who used the online messaging intervention had significantly higher rates of medication compliance, significantly lower levels of depressive symptoms (according to the HSCL), and significantly greater satisfaction with their depression treatment than did those in the control group.

Use in Treatment of Eating Disorders

A variety of interventions using a range of new technologies have been implemented with people who have eating disorders, although most are intended to treat bulimia nervosa (BN) specifically. A nonsystematic review of the use of new technologies in the treatment of eating disorders and body image problems found that interventions delivered via CD-ROM or the Internet were effective treatments for eating disorders and that a variety of other technologies (e.g., email, text

messaging, palmtop computers) had been shown to be effective adjuncts to in-person treatment (Paxton & Franko, 2010).

Wilson and Zandberg (2012) reviewed research on self-guided CBT for eating disorders. They found that in many studies, therapist-guided, computer-based treatments for BN are superior to nontreatment controls, such as waitlist controls. Mitchell et al. (2011) indicated that such interventions can be as effective as CBT delivered in person. Wilson and Zandberg (2012) also observed that self-guided interventions using computers were effective at treating binge eating disorders, more effective than nontreatment controls, and comparable with a number of active treatments (e.g., behavioral weight loss treatment, treatment as usual). Similar findings from a smaller number of studies also suggested that these approaches were effective for treating eating disorders not otherwise specified. In addition, Wilson and Zandberg (2012) reviewed literature showing that:

- Self-guided interventions, although they were not as well-received as interpersonal therapy according to one comparative study, were generally well-rated by users in terms of their suitability and helpfulness.
- Attrition rates for these interventions were comparable with those of other treatments; controlled studies found that about one-third of clients drop out of treatment.
- These interventions were cost-effective.

Some individuals with eating disorders may prefer computer-based/Internet-based interventions to those delivered in person (Johnston, Startup, Lavender, Godfrey, & Schmidt, 2010; Shapiro et al., 2007). However, Paxton and Franko (2010) cautioned that one potential problem with many interventions that deliver care for eating disorders at a distance is the inability of the provider to accurately visually monitor the client's physical condition and thereby ensure that it has not worsened. Mitchell and colleagues (2008) compared CBT treatments for BN delivered in person (n=66) and by videophone technology using dedicated terminals and T1 lines (n=61) for women in eastern North Dakota and northwestern Minnesota. At an assessment 1 year after treatment, the authors found slightly, but not significantly, higher rates of abstinence from binging and purging and significantly greater reductions in thoughts related to binging and purging (measured with the Eating Disorder Examination) for those who received the intervention delivered in person. Both groups had a high dropout rate, but there were no significant differences in retention. The authors concluded that the differences in outcomes between the two groups were not large, and that, in general, the study supported the idea that CBT interventions could be delivered using telemedicine technology.

A Spanish study evaluated an online psychoeducation and self-guided intervention based on CBT principles in which participants had weekly contact with a coach/therapist using a secure messaging program and unlimited contact with peers through an online discussion forum (Fernández-Aranda et al., 2009). At the end of the 4-month intervention, compared with individuals in a waitlist control group, those who received the intervention were significantly more likely to be abstinent from both binging and purging during the 2 weeks prior to assessment (22.6 percent of those in the intervention group were abstinent compared with none of those in the control group). Another Web-based, self-guided intervention using CBT principles, which included an online discussion forum for participants and weekly contact with a graduate student counselor, was evaluated in Sweden (Ljotsson et al., 2007). The authors found significant improvements at the end of treatment for those who received the intervention compared with

those in the control group, with 46 percent of treatment completers reporting abstinence from binging and purging during the 28 days prior to assessment.

Yet another CBT-based online self-guided intervention for BN was evaluated in Switzerland (Carrard et al., 2006; Carrard, Crépin, et al., 2011). Carrard, Crépin, et al. (2011), in a study involving 127 individuals with BN or subclinical levels of BN symptoms, found that the participants who used the intervention had significantly greater improvements in terms of eating disorder symptoms, body dissatisfaction, drive for thinness, and binge eating episodes than did participants who were in a waitlist control group. They also found that the improvements were maintained 6 months after the intervention concluded. In another trial, this Web-based CBT intervention for BN was evaluated in four different European countries, and participants who used the intervention experienced significant improvements in eating disorder symptoms and general symptoms of psychopathology (as measured by the SCL-90-R) following its use (Carrard, Fernández-Aranda, et al., 2011).

In Great Britain, Sánchez-Ortiz et al. (2011) evaluated another Web-based CBT intervention for BN that was designed for female college students (N=76). Participants who used the intervention had significantly better outcomes in terms of eating disorder symptoms and behaviors according to a number of different measures than did participants in a waitlist control group. In a pilot study, Shapiro and colleagues (2007) compared a CBT treatment for binge eating disorder delivered via CD-ROM with an in-person CBT intervention and a waitlist control group using a group of 66 individuals with anorexia nervosa (AN) or BN. The authors found no significant differences in terms of frequency of binging between the two interventions, with both interventions associated with significant declines in the number of days of binge eating. Many participants who received the CD-ROM intervention reported continued use of the program after the intervention concluded, and the majority of participants in the waitlist control group chose to receive CD-ROM treatment rather than the in-person treatment after the waiting period concluded.

Email has also been used with some effectiveness to deliver treatment for eating disorders. For example, Robinson and Serfaty (2008) compared outcomes for 110 individuals with BN or binge eating disorders assigned to an email treatment, to a self-directed writing intervention with minimal therapist contact, or to a waitlist control group. At the end of the 3-month treatment, a significantly greater percentage of participants in the two treatment groups, compared with those in the control group, no longer met criteria for an eating disorder. There were, however, no significant differences between the two treatment groups.

Other technologies have also been used to support treatment for eating disorders, including VRET (Perpiñá, Botella, & Baños, 2003; Riva, Bacchetta, Cesa, Conti, & Molinari, 2004), text messages (Robinson et al., 2006), and palmtop computers (Norton, Wonderlich, Myers, Mitchell, & Crosby, 2003). Ferrer-García and Gutiérrez-Maldonado (2012) reviewed research on the use of VR to assess body image distortion and in the treatment of eating disorders. They concluded that although research of better quality is needed, the use of VR in addition to other treatment improves outcomes, especially in relation to body image dissatisfaction.

Use in Treatment of Pathological Gambling

A few interventions for pathological gambling have been developed for use via phones or computers. Gainsbury and Blaszczynski (2011) conducted a literature review of Web-based, self-

guided interventions for problem gambling and concluded that such interventions can be successful, are cost-effective, and may reach potential clients who would not otherwise seek traditional treatment for pathological gambling. Carlbring, Degerman, Jonsson, and Andersson (2012) evaluated the effectiveness of a Web-based CBT intervention for pathological gambling with 284 Swedish individuals who had gambling disorders. The intervention involved minimal contact with a therapist via email or phone in addition to the Web-based component, with an average of 4 hours of staff person time per participant. Participants experienced significant decreases in symptoms of pathological gambling, depression, and anxiety, as well as improvements in quality of life; significant improvements were found up to 36 months after treatment. Individuals were significantly more likely to respond to the treatment if they did not engage in heavy drinking (i.e., typically consumed two drinks or less during drinking episodes) and did not experience dissociative symptoms during gambling (i.e., did not completely lose track of time).

Fewer phone-based interventions are available for problem gambling, but in Australia, callers to a gamblers' helpline (N=230) were recruited for a telephone-based intervention that used motivational interviewing and CBT principles in scheduled phone calls (Rodda & Lubman, 2012). The program has been well-received by participants, many of whom would not otherwise have sought in-person treatment.

Use in Treatment of Other Mental Disorders/Problems

Phone-based and computer-based interventions have also been developed for BPD, trichotillomania, psychotic disorders, and chronic insomnia.

Rizvi et al. (2011) evaluated the use of an interactive mobile phone application to help in dialectical behavior therapy, an established treatment for BPD, by providing ongoing assessment and coaching. A pilot study involving 22 individuals with co-occurring BPD and substance use disorders found significant decreases in substance-related cravings and emotional intensity. Participants also experienced significant decreases in depression and general psychological distress over the course of the study.

German researchers have developed a CD-ROM program to improve client skill acquisition in the use of dialectical behavior therapy (Wolf et al., 2011). In a small (N=24) pilot study, participants who used the program showed significantly greater improvements in demonstrating knowledge related to skills taught in treatment and a greater ability to categorize concepts related to skills than did those in the control group, who received dialectical behavior therapy alone.

Also in Germany, Moritz and Rufer (2011) randomly assigned 42 individuals with trichotillomania to receive a self-guided intervention (i.e., decoupling) delivered via email or to participate in a control group who received instructions via email for progressive muscle relaxation. Participants who received the self-guided decoupling intervention had significantly greater reductions in trichotillomania behaviors, but declines in depressive and OCD symptoms did not differ significantly between the two groups.

Video conferencing has been successfully used with clients with schizophrenia and other psychotic disorders (Sharp et al., 2011). Although some clinicians have found that people with psychosis have difficulty interacting with video conferencing, Grady and Singleton (2011) found

that people with psychosis did not react negatively to video conferencing, nor did they experience exacerbations of symptoms.

Computer-based psychoeducational interventions have also been developed for people with schizophrenia and their families/friends. A Cochrane review conducted by Välimäki et al. (2012) that included six randomized trials found evidence that psychoeducation delivered using computer technology was associated with short-term improvements in mental state and a perception by clients that, compared with control groups, they had greater social support. Also, such psychoeducation was associated with long-term, but not short-term, improvements in medication compliance. However, no significant differences were found in quality of life or functional disability between people with schizophrenia who received computer-based psychoeducation and those who received traditional printed education materials, although both groups had significantly better outcomes than did those who received no psychoeducation intervention (Pitkänen et al., 2012). Further information on programs for clients with BPD or schizophrenia that use mobile technologies for continuing care and for family psychoeducation and assistance is provided in the two sections that follow.

A number of Web-based interventions have been developed for chronic insomnia, a symptom associated with multiple mental and substance use disorders. For example, Vincent and Lewycky (2009) evaluated a brief, fully automated, online treatment for insomnia that included multimedia content in a group of 118 individuals with chronic insomnia who were either referred by physicians or recruited from the community. All participants were also receiving standard care for any diagnosed mental or substance use disorders, including sleep disorders, but individuals with mania, schizophrenia, or elevated substance use were excluded from the study. Compared with participants assigned to a waitlist control group, those who used the intervention had significantly greater improvements in sleep quality, severity of insomnia, and daytime fatigue. About one-third of participants dropped out of treatment, but individuals who had been referred rather than recruited from the community were significantly more likely to drop out.

Ritterband et al. (2009) evaluated an online CBT intervention for insomnia (Sleep Healthy Using the Internet [SHUTi]) with a group of 45 individuals who met criteria for a diagnosis of primary insomnia. Participants were randomly assigned to the intervention or to a waitlist control, and the authors found that participants who used SHUTi had significant improvements in insomnia symptoms and sleep efficacy, whereas those in the control group did not show any significant change. Improved outcomes were also found at the 6-month follow-up assessment. In Great Britain, Espie et al. (2012) evaluated another online CBT treatment for chronic insomnia that used an animated virtual therapist, automated mobile text messages and/or email reminders, and a moderated online discussion board. Participants in the study were randomly assigned to receive the intervention (n=55), to receive another online treatment (imagery relief therapy) presented in much the same way (n=55), or to participate in a treatment-as-usual control group that involved receiving standard services for insomnia from primary care doctors (n=54). Compared with the other two groups, participants who received online CBT had significantly greater improvements in sleep efficacy.

Use in Continuing Care/Symptom Monitoring for Mental Illness

A number of programs are currently in development or being tested to help people with mental illness monitor their recovery and alert providers when intervention is required. One of the

largest of these programs is VA's My Recovery Plan. Through a VA Web site (*My* health***e***Vet; http://www.myhealth.va.gov), veterans and their family members can receive educational materials about mental and substance use disorders; use screening tools to help them (and their family members) determine whether they have a problem that may require treatment; and monitor and relay to providers information on pertinent issues, such as mental disorder symptoms, medication compliance, progress toward recovery goals, and use of coping skills (Bush, Bosmajian, Fairall, McCann, & Ciulla, 2011; Cucciare, Weingardt, & Humphreys, 2009; Weingardt & Lysell, 2007).

Phone technologies can also be used for ongoing care and symptom monitoring. For example, the Connecticut VA system implemented a behavioral health management system that used electronic messaging devices connected to phone lines that enabled participants (who had been diagnosed with schizophrenia, PTSD, depression, or substance use disorders) to report daily information about their behavioral health (Godleski, Darkins, et al., 2012). When reported data indicated a potential problem, participants were contacted by phone for further assessment and, if necessary, scheduling of appointments. In the initial 2 years of the program, 76 patients with a variety of mental and substance use disorders used the system. The number of participants who were hospitalized went down from 42 in the 6 months prior to the intervention to 6 in the first 6 months of the intervention, and the number of emergency room visits went down from 80 to 16.

A number of other interventions using telephones or computers for medication monitoring have been successfully used with people who have schizophrenia. For example, Frangou, Sachpazidis, Stassinakis, and Sakas (2005) evaluated a computerized medication dispenser, which transmits information when the dispenser is used, with a group of 108 individuals with schizophrenia whose medication was monitored by the device, by a pill counting system, or by self-report. Participants who used the computerized dispensers had significantly greater reductions in emergency room use and medical appointments and significantly greater improvements on the Global Clinical Impression Scale compared with those in the control groups. The dispensers were well-received by users and required only minimal training for use.

Ruskin and colleagues (2003) used the interactive, computerized Med-eMonitor system for prompting medication compliance; monitoring symptoms, signs, and medication use; and providing educational information in their pilot study of 22 outpatient clients with schizophrenia or a schizoaffective disorder and 16 of the clients' caregivers. Ruskin and colleagues (2003) found a wide range of responses to the Med-eMonitor, from one client believing it made his symptoms worse to most of the participants finding it easy to use and helpful with compliance. Also, the three clinicians whose clients were in the pilot study found the Med-eMonitor system useful in terms of gaining information about whether clients actually did or did not take their medications and how client symptoms waxed and waned, as well as seeming to assist some clients in developing positive habits related to medication use.

Sachpazidis and Majadas (2006) have developed another system for medication management and reminders using cell phones. Also, software is available that uses a relational agent (i.e., an animated image of a person) that interacts with users to motivate them and help improve their medication compliance (Puskar, Schlenk, Callan, Bickmore, & Sereika, 2011). Other uses of technology in relation to medication management for people with schizophrenia include software

to aid in making decisions about medication use (Deegan, 2007) and a VR simulation to assess clients' medication management skills (Kurtz, Baker, Pearlson, & Astur, 2007).

Another smartphone application, called FOCUS—which combines medication management, symptom management, and components that assist with sleep hygiene and social functioning—has been evaluated in a pilot study with 33 individuals with psychotic disorders (Ben-Zeev et al., 2014). More than 90 percent of participants found FOCUS to be highly acceptable and usable, and all but one participant completed the trial successfully. The authors found no significant relationships between use of the program and participants' cognitive functioning, severity of negative symptoms, reading level, or the presence of persecutory ideation. A pretest–posttest evaluation found that participants had significant improvements in positive symptoms, general psychopathology, and depressive symptoms following 1 month's use of the program.

Eating disorders

In Germany, Fichter et al. (2012) evaluated a Web-based relapse prevention intervention for women with AN or subclinical AN behaviors who had completed inpatient treatment for the disorder. Participants were randomly assigned to receive the 9-month intervention plus standard continuing care or continuing care alone. During the 9-month period, those who received the intervention gained significantly more body weight and showed significantly more improvement in a number of eating-related behaviors and cognitions (e.g., sexual anxieties, bulimic symptoms, social anxieties).

Gulec et al. (2011) conducted a small pilot study (N=20) in Hungary evaluating a Web-based, therapist-supported continuing care program for people with BN or eating disorders not otherwise specified. The program was well-received, with 71.4 percent of participants stating that they found it mostly helpful or very helpful.

Depression

Web-based CBT has been successfully used for continuing care with clients who have had major depression. In a Swedish study, 84 individuals with partially remitted major depression who had previously been treated for that disorder were randomly assigned to a 10-week Web-based continuing care intervention (which used a self-guided intervention combined with email contact with a therapist) or to a no-treatment control group (Holländare et al., 2011). Participants who received the intervention were significantly less likely, compared with those in the control group, to experience a relapse to major depression during treatment and up to 6 months later.

Bipolar disorder

A few different Web-based programs have been developed to help individuals with bipolar disorder and their families with ongoing symptom monitoring and long-term recovery. For example, a multimedia Web site from the Black Dog Institute in Australia was developed to provide education for clients and their families with modules on such topics as psychosocial treatments, medication, and symptom monitoring (Proudfoot et al., 2007). In addition, the site provides self-testing for depression as well as bipolar disorder. At the time of the study, the program was being evaluated to determine whether it improves client self-management and psychosocial outcomes (Proudfoot et al., 2007). Another Australian Web site (http://MoodSwings.net.au) was developed to help individuals with bipolar disorder manage the

disorder and includes self-guided modules, a user discussion board, and an online mood diary (Lauder et al., 2012). The evaluation of the program is also ongoing.

Beating Bipolar is a Web-based program developed in the United Kingdom to aid in the management of bipolar disorder by improving quality of life and reducing relapses (Smith, Griffiths, et al., 2011). However, its use in addition to standard treatment was not found to be associated with significantly better outcomes on most measures than standard treatment alone. The one exception to this is in the scores on the psychological subsection of the World Health Organization Quality of Life scale, where participants who received the intervention showed modest improvements that were significantly greater than those observed in members of the control group.

Another online recovery program for people with bipolar disorder is MyRecoveryPlan (not to be confused with the VA program of the same name), which provides psychoeducation, recovery guidance, self-monitoring tools, social networking tools, and tools to help clients become more active participants in behavioral health services (Simon, Ralston, et al., 2011). In a pilot study, 118 participants recruited from online and in-person support groups for people with bipolar disorder were randomly assigned either to receive the intervention alone or to the intervention with an additional peer coaching component. Those participants who had email communication with a peer coach were significantly more likely to return to use the program after they registered and were significantly more likely to continue using the program for more than 3 weeks.

Todd, Jones, and Lobban (2012) reported on focus group discussions conducted with people with bipolar disorder in the United Kingdom to identify their preferences concerning Web-based self-management tools. They found that individuals with bipolar disorder who sought behavioral health services reported a preference for Internet-based services because of their perception that evidence-based interventions were more accessible via this medium. However, focus group participants did discuss lack of motivation and procrastination as potential problems in the use of such interventions over the Web.

Schizophrenia

Mobile phone interventions are available for ongoing symptom monitoring and continuing care for people with schizophrenia. Granholm et al. (2012) reported on a noncontrolled study of three components of the Mobile Assessment and Treatment for Schizophrenia intervention, which uses text messages and assessment questions delivered via mobile phones to assist with medication management, socialization, and symptom monitoring. They found that participants significantly improved in medication compliance, significantly increased social interaction, and had significant reductions in auditory hallucinations after initiating use of these programs. About a quarter (23.6 percent) of participants—those with more severe negative symptoms and worse functioning—did not complete the intervention. Another mobile intervention for people with schizophrenia, which provides a schedule manager and allows for symptom monitoring, was developed in Canada, but client satisfaction in a pilot study was low, and further evaluation has been called for (Sablier et al., 2012). Also, in using the Med-eMonitor system mentioned previously, Ruskin et al. (2005) found that 36 percent of the 22 clients with schizophrenia or schizoaffective disorders were unable or unwilling to use the device in their home setting.

Peer support/mutual-help groups

An important part of continuing care for many people with mental and substance use disorders is the use of mutual-help groups, and a variety of mutual-help Web sites, chat rooms, and services are available for this purpose. Although the use of mutual help, because it is not treatment per se, is beyond the scope of this TIP, articles are available that discuss the use of Web-based mutual help and its potential benefits and problems (Barak et al., 2010; Bennett, Reynolds, Christensen, & Griffiths, 2010; Griffiths et al., 2009; Melling & Houguet-Pincham, 2011).

Barak et al. (2010) cited evidence, mostly from outside the behavioral health field, indicating that online support groups can be effective at improving participants' sense of empowerment and well-being. They identified research that indicates that the following factors, which are involved in online peer support, can help participants:

- The exchange of relevant knowledge
- The psychological effects of writing
- Giving and receiving emotional support
- Discovering that one's experiences are not unique
- Gaining social recognition
- Creating and sustaining interpersonal relationships
- Helping others
- Getting assistance in making decisions
- Sharing personal experiences
- Experiencing fun/amusement

Although data are limited, the available data suggest that many individuals with either mental illness or concerns about mental illness symptoms do seek help and support online. For example, in an Australian survey of 74 college students, 53 percent of participants reported using the Internet for mental health support (O'Dea & Campbell, 2011).

Many individuals with mental illness, especially those who are younger, also commonly use online social networking sites and chat forums, suggesting that they would use peer support Web sites. For example, according to a National Alliance on Mental Illness survey of 274 young adult members, 94 percent of members with mental illness used social networking Web sites (Gowen, Deschaine, Gruttadara, & Markey, 2012). Respondents with a mental disorder were also significantly more likely to use such sites to make friends or connect with people with similar interests than were other respondents (typically family members of individuals with mental illness).

In most cases, there are few or no data on the potential benefits or drawbacks of Internet support groups for people with mental or substance use disorders. For example, in their review of such groups for individuals with depression, Griffiths et al. (2009) concluded that "the evidence is not of sufficient quality or strength to inform decision making" (p. 9). In a later review of Internet peer support for depression, Melling and Houguet-Pincham (2011) reached essentially the same conclusion, although they found anecdotal evidence to support the use of such groups.

Haug et al. (2008) reported positive anecdotal evidence from a German program that used an Internet chat group for continuing care following inpatient treatment for severe psychosomatic or

neurotic disorders. Internet chat groups enabled geographically dispersed individuals to continue group interactions that began while they were in treatment. Houston et al. (2002) followed a group of users of one of five online depression support groups who self-selected to participate in the study for a 1-year period to evaluate changes in depressive symptoms (according to the CES-D). They found that individuals who were frequent users of the group (i.e., used it for 5 or more hours in a 2-week period) were more likely to gain remission from depression (i.e., had CES-D scores of 22 or lower) than were less frequent users, even after controlling for demographic factors and baseline CES-D scores.

However, there is some evidence that such groups may not be beneficial for clients with serious mental illness, particularly if they are unmoderated. Kaplan et al. (2011) randomly assigned 300 individuals with a schizophrenia spectrum or affective disorder to an unmoderated peer-support electronic mailing list, to an unmoderated peer-support Internet bulletin board, or to a waitlist control group. Although an intent-to-treat analysis did not find significant differences in outcomes among the three groups, a post hoc analysis did find that participants who reported greater use of either form of Internet peer support reported significantly more psychological distress than did individuals with low levels of participation. Also, among peer support users, there was a significant correlation between having more positive experiences with the support group and having more psychological distress. The authors observed that most of these participants, who were recruited from Web sites and email newsletters for people with mental illness, were currently engaged in treatment for their mental illness and had relatively high rates of employment and marriage/being partnered, which may have marked the group as different from other treatment-seeking samples. Also, they noted that the unmoderated nature of the two support groups may have made a difference in how those interactions affected participants.

Interventions for family members

Web-based services aimed at family members of people with mental illness may improve family members' abilities to address problems, such as the return of symptoms as well as other aspects of family members' behavioral health (Stjernswärd, Östman, & Löwgren, 2012). Grover et al. (2011) reported on a Web-based intervention for family members of people with AN in the United Kingdom. Compared with a control group who received standard support services, participants who used the program had significantly greater reductions in anxiety and depression as measured with the Hospital Anxiety and Depression Scale and in levels of expressed emotion (i.e., overinvolvement and criticism in response to their family member's eating disorder), as evaluated with the Level of Expressed Emotion Scale.

Rotondi (2010) described and provided some data for a Web-based intervention for clients with schizophrenia and their families called Schizophrenia Online Access to Resources (SOAR). The intervention provides multifamily psychoeducation; teaches skills to improve self-efficacy, self-management of symptoms and effects of the disorder, and problem-solving abilities; provides mechanisms for peer support; and helps users identify and meet their own goals. In developing the SOAR Web site, designers considered the types of cognitive deficits people with schizophrenia often face to produce a more usable site (e.g., by using memory aids to help with navigation, requiring a minimal amount of abstract thinking, not using decorative features that might distract users). Specific components of the SOAR program included three therapy groups (one for clients with schizophrenia only, one for a client's family members and others in his or her support network, and a multifamily group for all site users), a module that allowed users to

ask questions of experts anonymously, educational resources, and a list of community resources. Preliminary data indicate that the site was well-received and often used by clients and their families, and users with schizophrenia had significantly less perceived stress and significantly greater reductions in positive symptoms of schizophrenia compared with a treatment-as-usual control group.

In another publication, Rotondi et al. (2010) reported on 1-year outcomes for participants in the SOAR pilot study (31 people with schizophrenia and 24 support people). They found that, compared with those who received usual care alone, those who used the intervention had significantly greater reductions in positive symptoms and significantly greater increases in knowledge about their disorder. Support people who used the intervention, compared with those connected to participants in the control group, also had significantly greater increases in knowledge about the disorder. Glynn, Randolph, Garrick, and Lui (2010) conducted a small (N=36) preliminary evaluation of a Web-based program (the Online Relative Support Program) to provide the families of people with schizophrenia with psychoeducation and support. The program was well-received by users, but it appeared to have only a minimal impact on outcome measures for the person who had schizophrenia compared with data from comparable clients. Dausch et al. (2009) provided a case history of a client with a schizoaffective disorder who was participating in family-focused video conferencing therapy with his mother.

The U.S. military and VA have developed Web sites to help family members of veterans with mental or substance use disorders. For example, VA has developed an online psychoeducational program for family members of individuals with schizophrenia that has been well-received in pilot testing (Glynn et al., 2010). Another psychoeducational Web site for family members of military personnel/veterans with PTSD has been pilot tested, and 57 percent of users reported taking action to discuss PTSD symptoms with a family member; between 82 and 95 percent of those individuals believed that discussion was beneficial (Roy et al., 2012).

Promoting Compliance, Engagement, and Retention

Data are limited concerning potential problems with treatment compliance and retention for phone- and computer-based interventions, but there are some indications that there may be more, or at least different, problems in these areas than are found with traditional methods of treatment delivery. For example, Kiluk et al. (2011) found that only 15 percent of the 75 randomized trials of computer-assisted therapies they evaluated had retention rates of 80 percent or higher. Many studies also failed to report compliance data. A review by Waller and Gillbody (2009) did find higher, but not significantly so, dropout rates for participants using Web-based interventions compared with those receiving services in person, but they also observed that this was not the case in every trial they reviewed. Personal circumstances (e.g., a lack of time) were most often cited as the reason for dropping out of Web-based programs. On the other hand, a number of users of Web-based interventions, in giving their reasons for use, stated that they would not have bothered to seek services from a healthcare provider (given that most of the interventions reviewed took place in Europe, this usually referred to primary care doctors).

Research suggests that telephonic interventions may reduce attrition relative to in-person interventions. A meta-analysis of telephone-based interventions for depression found a relatively low rate of attrition (7.6 percent) across 12 different studies (Mohr et al., 2008). Studies that used

a mental health professional rather than a professional from outside the behavioral health field, those that provided individual rather than group services, and those that used CBT rather than another orientation for treatment all had significantly lower attrition rates.

A more recent study found significantly higher attrition for people receiving CBT treatment for depression in person than for those receiving such treatment by phone (Mohr et al., 2012). That study found the largest difference in attrition during the first 5 weeks of treatment. Some video conferencing interventions have also had relatively high retention rates. For example, a Spanish study of video conferencing for a variety of mental disorders retained 130 of 140 participants for the full 24 weeks of treatment (De Las Cuevas, Arrendondo, Cabrera, Sulzenbacher, & Meise, 2006). VA's small (N=27) pilot study of an intervention that combined two-way interactive text messaging and ecological momentary assessment was able to increase participant involvement significantly (going from a rate of 23 percent in the first cohort to 89 percent in the second cohort) by changing to scheduled messages rather than random ones and providing a single electronic device to do both tasks rather than two devices (Smith, Harms, et al., 2012).

Researchers have found some ways to improve retention for Web-based treatments. For example, a research group in Germany, by using email reminders and nonfinancial incentives, was able to maintain a relatively high rate of retention across interventions for depression (Moritz et al., 2012), OCD (Moritz, Jelinek, Hauschildt, & Naber, 2010), and trichotillomania (Moritz & Rufer, 2011). In an article discussing best practices for online therapy, Abbott, Klein, and Ciechomski (2008) suggested that incorporating graphics and media files into treatment materials and requiring homework exercises can improve client engagement and retention.

Compliance with Web-based treatment may also be improved by using guided rather than unguided interventions. For example, research comparing guided and unguided online treatments for SAD found significantly better compliance among participants who received the guided intervention (Nordgreen et al., 2012). Participants who perceived their treatment as highly credible were also significantly more likely to comply with treatment protocols than were those who perceived the treatment as less credible. Titov, Andrews, Choi, Schwencke, & Mahoney (2008) also found greater compliance among participants who received a guided online intervention for social anxiety symptoms than among those receiving an unguided intervention.

In a series of studies concerning factors associated with Web-based treatment compliance for both anxiety and depressive disorders, Hilvert-Bruce, Rossouw, Wong, Sutherland, and Andrews (2012) found that greater contact with clinicians was associated with greater treatment compliance, even if that contact was only in the form of email to motivate the client to complete the entire course of treatment. In addition, they found that after implementing four practices to improve compliance, based on findings from prior research (i.e., allowing clients more choice over the course and timing of online modules, requiring a higher initial fee to use the program and less money per session, providing customized reminders in addition to automatic reminders, and ensuring that clients had clinician contact), full compliance with the treatment increased significantly from 37.9 percent to 60 percent of users. Despite participants who completed these treatments having significantly greater decreases in mental distress (as measured by the Kessler 10-Item Scale) than noncompleters, noncompleters also had significant improvements in this area, and both completers and noncompleters showed a similar pattern of correlation between the number of treatment modules completed and lower ratings of mental distress.

New technology can also be used to improve engagement and retention for clients receiving traditional behavioral health services. Seal et al. (2012) reported on a VA program in which 73 people who had been screened via a telephone screening system as possibly having one or more mental disorders were either given four sessions of motivational interviewing via phone and referred to treatment or referred and given four neutral phone calls providing logistical information about behavioral health services. Using an intent-to-treat analysis, the authors found that participants who received the intervention were more than twice as likely to enter a behavioral health program as those in the control group and had significantly higher rates of retention after receiving services.

Researchers conducted a small pilot study where 24 adult children of people with an alcohol use disorder were randomly assigned to 10 weeks of group therapy; to use of a computer program (Comprehensive Health Enhancement Support System [CHESS]) that provided resources to improve social relatedness, coping competence, and motivation; or to both group therapy and CHESS (Gustafson, Shaw, et al., 2011). Average attendance at weekly group sessions increased from 38 percent to 82 percent when CHESS was added to group psychotherapy. Also, users of the CHESS program had, on average, a 10 percent improvement in self-reported quality of life, but those who received group therapy only experienced a decline in quality of life during the same period. However, given the small sample size, no tests of significance were performed.

Technology in the Treatment of Substance Use Disorders

New technologies have many potential uses for substance use disorder treatment programs, both as stand-alone interventions and as ways of improving existing services. They may also reach populations who might not otherwise seek such services. A number of authors have observed that clients seeking Web- and phone-based substance use disorder treatment services are more likely to be younger and often have responsibilities that make use of traditional treatment services difficult (Swan & Tyssen, 2009). However, only a couple of studies have attempted to evaluate how individuals using such services may differ from those who use traditional substance use disorder treatment services. Data from Australia indicated that clients seeking substance use disorder treatment services online or by phone (n=277) were more likely than those seeking such services in person to be female, and those seeking services online were significantly younger and more likely to be employed than those seeking services by phone or in person (Swan & Tyssen, 2009).

Lieberman and Huang (2008) surveyed 1,060 individuals who sought an online assessment of their drinking, who had AUDIT scores of eight or higher (indicating at least problematic drinking), and who agreed to participate in the study. They compared demographic and other factors for this group with those of 952 clients in the outpatient treatment arm of a large national study (Project MATCH). Participants who used the Web site were significantly younger, more likely to be female, and more likely to be employed than the outpatient group. The mean AUDIT score for Web site users was 20, which, despite being significantly lower than that of the treatment group (who had a mean score of 26.1), still indicated a high level of alcohol-related problems. Users of the Web site had a significantly lower level of problem recognition and greater level of ambivalence about drinking (both according to the Stages of Change Readiness and Treatment Eagerness Scale) compared with those in outpatient treatment. The authors

concluded that a Web-based intervention to increase motivation for treatment would be useful and could reach individuals who were not yet prepared to enter traditional treatment.

Cucciare et al. (2009) reviewed research on a number of areas where Internet technology can support existing substance use disorder treatment services, including in the provision of brief motivational interventions, concurrent recovery monitoring, and long-term recovery management. An earlier review by Copeland and Martin (2004) concluded that, in spite of limited data and methodological problems with some studies, Web-based interventions were effective alternatives to standard substance use disorder treatment for clients who were less severely dependent and for brief interventions. Rooke, Thorsteinsson, Karpin, Copeland, and Allsop (2010) conducted a meta-analysis of computer- and Web-delivered interventions for either alcohol or tobacco use and found an overall, weighted average effect size of 20 ($p<0.001$) for the 42 studies they identified, with the tobacco interventions having significantly lower effect sizes compared with interventions targeting alcohol. They also determined that many common components of these interventions (e.g., group discussion, entertaining features, normative feedback, a focus on relapse prevention) did not significantly influence effect size.

Computer-based interventions for drug use disorders are less common than those for tobacco or alcohol use. In a review of such interventions, Moore et al. (2011) found 12 studies that they considered of at least moderate quality (11 of which used control conditions). They concluded that, compared with control conditions (most often treatment as usual, followed by assessment only), computerized interventions were associated with significantly greater reductions in drug use according to self-report and urinalysis during the treatment period, with some evidence that the effects continued after treatment. They also observed that clients were generally satisfied with computerized interventions and had similar levels of engagement and retention to those found in interventions delivered in person by a counselor. In addition to its use as a way to deliver treatment, computer and Internet technology can also be used to support treatment in a variety of ways. For example, Alemi et al. (2005) discussed the use of email communication to increase family involvement in a client's substance use disorder treatment and, in particular, using the family to improve a client's motivation for change.

Use in Screening and Assessment

In general, screening for substance use disorders and/or potentially harmful use conducted by computer, whether at a terminal in a treatment facility or over the Internet, appears to be as effective as self-administered screening instruments that use paper and pen (Miller et al., 2009). Some research also indicates that clients may prefer revealing certain types of information when using a computer rather than directly to another person (Butler et al., 2001; Erdman, Klein, & Greist, 1985; Lessler et al., 2000). For example, research on the computer-delivered Addiction Severity Index-Multimedia Version (ASI-MV) found that individuals were significantly more likely to disclose about a number of different things (e.g., sedative use, the importance of substance use disorder treatment, legal difficulties, family conflict) on the ASI-MV than when another person administered the index (Butler et al., 2009). Research also indicates that automated assessments are well-received by substance use disorder treatment clients (Hile & Adkins, 1997).

Miller, Kraus, Kaak, Sprang, and Burton (2002) compared three different methods for completing a variety of alcohol screening instruments: paper and pencil, delivery via the Internet,

and delivery via the Internet with an interruption to simulate conditions that might occur for some individuals using a Web-based screener. They found no significant differences among the three assessment methods. The instruments they evaluated were the Alcohol Dependence Scales, the AUDIT, the Rutgers Alcohol Problem Index, and the University of Rhode Island Change Assessment. Many commonly used substance use disorder screening and assessment instruments have been adapted for computer/Internet use and found to be valid in that format. For example, the ASI has been adapted for Internet and automated telephone use and was found to be reliable compared with in-person assessments and based on polls that gauged general satisfaction among users (Brodey et al., 2004). The ASI-MV has also been found to be reliable, valid, and well-received by users when administered by computer (Butler et al., 2001; Butler et al., 2009). Researchers have also found the Alcohol Timeline Followback instrument to be reliable when administered by telephone or computer (Sobell, Brown, Leo, & Sobell, 1996).

There are also some substance use disorder screening and assessment instruments that have been developed specifically for delivery over the Internet. For example, the Dynamic Assessment and Referral System for Substance Abuse (DARSSA) is a computerized screening and assessment program that provides personalized feedback and referrals to treatment when appropriate. DARSSA was evaluated with a group of 85 patients from an emergency department (ED) and progressive care unit at a large urban hospital, and it identified 48 percent of participants as engaging in risky substance use, including a number of participants who had not been so identified during their medical assessments (Boudreaux et al., 2009). In that pilot study, 42 percent of the participants identified as engaging in risky substance use accepted the DARSSA referrals to treatment.

Vernon (2010) reviewed seven studies of online drinking assessments not discussed here, most of which use the AUDIT or Stages of Change Readiness and Treatment Eagerness Scale for screening purposes, but did not provide any conclusions about the effectiveness of those instruments when administered online. He did, however, note that those studies found that between 12 and 63 percent of site visitors completed the assessment instrument, with an average across instruments of 56.4 percent of visitors.

Video conferencing can be used to assess substance use disorders, but not all studies have found that assessments made using this technology were as effective as those made in person, at least with specific populations. For example, a study conducted with 53 American Indian veterans found that substance use disorders were significantly more likely to be assessed following an in-person interview than they were when the same clients were assessed by different interviewers via video conferencing, whereas there were no significant differences in other behavioral health diagnoses (Shore et al., 2007).

Use in Early Intervention

The line between prevention and early intervention is not always clear, and a number of the prevention programs discussed previously may also be considered early intervention programs, because they provide a brief intervention aimed at decreasing alcohol use or else helping people whose drinking is risky to determine whether they have a problem warranting further treatment. Similarly, some programs (Williams, Herman-Stahl, Calvin, Pemberton, & Bradshaw, 2009) have been used with general population samples, and in that application, they have a preventive function. As Cucciare and colleagues (2009) noted, technology facilitates the collection of

personal data on substance use patterns and can be used to generate personalized feedback with much less time and effort than was needed in the past. Web sites that offer screening are also a good way to interest people who are concerned about their drinking in considering treatment and in receiving information about treatments and links to resources (Lieberman & Massey, 2008; Linke, Murray, Butler, & Wallace, 2007; Vernon, 2010).

Vaca, Winn, Anderson, Kim, and Arcila (2011) conducted a 6-month telephone interview follow-up of 221 emergency room patients (57 percent of the 385 participants who had enrolled). The study was designed to increase and enhance the use of ED-based alcohol screening, brief intervention, and referral to treatment (SBIRT) by introducing ways that computers could reduce the burden of SBIRT on ED staff members and facilitate ED-SBIRT by organizing and making use of the information gathered through computerized screening with the development of a computer-guided brief negotiated interview and a computer-generated personal alcohol reduction plan. Excluding individuals who were intoxicated at the time, medically unstable, and/or being held for psychiatric evaluation, 4,375 patients were screened by computer using questions from the AUDIT; 781 (18 percent) screened as at risk for alcohol use problems and received both a computerized brief intervention (including feedback, reasons to cut down, goal setting, and readiness to change) and a personalized printed alcohol reduction plan. (Patients whose AUDIT scores were 19 or greater were seen by a social worker and referred to treatment, and they were thus not eligible for the study.) Of 586 eligible subjects, 385 participants agreed to be interviewed by phone after 6 months, but only 221 completed the interview. At the follow-up assessment, 47 percent of those who had screened as engaging in risky drinking no longer met criteria for risky drinking. Readiness to change, as assessed by the program, was a good predictor of who would lower their drinking beneath recommended limits.

Cunningham, Wild, Cordingly, Van Mierlo, and Humphreys (2009) described and evaluated a Canadian Web site (http://www.checkyourdrinking.net/CYD/CYDScreenerP1_0.aspx) using participants (N=185) who had previously been screened as meeting at least minimum criteria for risky drinking (i.e., AUDIT-Consumption [AUDIT-C] scores of 4 or higher). Participants were randomly assigned either to use the site or to fill out a written survey about the features they believed should be included on the site. Users of the site answered a brief series of questions and then received individualized feedback concerning their drinking, its potential effects, and related factors (such as drinking norms for people in their age group from their country). Participants completed questionnaires before using the site and then 3 and 6 months after. For individuals included in the study whose drinking was problematic (i.e., those who had AUDIT-C scores of 11 or higher at baseline), use of the Web site was associated with significant reductions in weekly alcohol consumption and in AUDIT-C scores at the 3- and 6-month assessments, with a typical reduction of between six and seven drinks per week.

A similar self-assessment Web site available in Finland was evaluated by Koski-Jännes, Cunningham, Tolonen, & Bothas (2007), using a sample of 343 self-selected users of the Web site. Participants completed a short set of questions that incorporated the AUDIT as well as other questions about the psychosocial consequences of their drinking. They were then provided with personalized feedback about their drinking and information about normal drinking in Finland. Participants were self-selected, so the authors compared their drinking patterns and AUDIT scores to those of a random sampling of other users of the Web. Those who agreed to participate in the study had significantly higher AUDIT scores as well as greater levels of consumption.

Participants were assessed at baseline and again 3 months later. At the follow-up assessment, AUDIT scores dropped significantly from a mean of 16.6 to 13.8; additionally, drinks consumed per week, drinks consumed on the last drinking occasion, and drinking consequences all declined significantly.

Another study of computerized screening and brief intervention for problem drinking was conducted at Boston University with 235 first-year students who had been screened as engaging in unhealthy drinking (i.e., had AUDIT scores of 8 or greater) and who completed both an initial and a 1-month postintervention assessment (Saitz et al., 2007). Participants were assigned to receive either a minimal or a more extensive (but still brief) intervention (the latter including three additional Web-based screenings) delivered over the Web. There were no significant differences between the two brief interventions; participants in both groups decreased their alcohol use, with 15 percent of the men and 33 percent of the women no longer meeting criteria for unhealthy alcohol use at the follow-up assessment. The interventions had a greater effect on women than men, and female (but not male) participants had significantly fewer drinks per week and fewer heavy drinking episodes after the intervention.

In an Australian study, 2,435 college students who had previously been screened as potentially having problems with drinking (i.e., had AUDIT scores of 8 or more and exceeded the Australian Government's drinking guidelines at least once in the prior month) were randomly assigned to an online screening and brief intervention site or to an online assessment-only control group (Kypri et al., 2009). At both 1 and 6 months after the intervention, those who used the intervention drank significantly less overall and significantly less frequently than did individuals in the control group. Web site users drank 17 percent less than control group members at the 1-month assessment and 11 percent less at the 6-month assessment. The follow-up rates and demographic/clinical profiles were comparable for intervention and control groups, with 65 percent of both groups available for the 6-month follow-up. In another article on the development of this program, Hallett, Maycock, Kypri, Howat, and McManus (2009) noted that 99 percent of users found it easy to complete, 76 percent said it gave them information that was relevant to their lives, and 55 percent stated that they would recommend it to others.

In another Australian study, Kay-Lambkin, Baker, Kelly, and Lewin (2012) randomly assigned individuals who were experiencing moderate or greater levels of depressive symptoms (i.e., had BDI scores of 17 or higher) and who used more alcohol than suggested by Australian national guidelines and/or used marijuana more than once per week to receive one in-person introductory treatment session followed by nine sessions of motivational interviewing/CBT delivered in person, supportive counseling delivered in person, or motivational interviewing/CBT delivered mostly by computer. Although 274 participants were assigned to treatment arms, only 163 completed an assessment 3 months after the start of the study, and outcome data were only reported for those 163. At the 3-month assessment, participants who received the computerized treatment had significantly greater reductions in alcohol use and reported significantly less alcohol use than did participants in either of the other treatment groups. However, a comparative trial of an identical brief intervention with personalized feedback delivered either in person or by computer with 84 college students who had previously screened as being at risk for alcohol use disorder found no significant differences in outcomes between the two methods of delivery (Butler & Correia, 2009). Participants receiving either version of the intervention did have

significantly better outcomes (in terms of quantity and frequency of alcohol consumption) than did members of a no-treatment control group.

DoD has conducted research evaluating factors associated with better outcomes for military personnel who used either a Web-based early intervention for drinking or a Web-based alcohol prevention intervention (Williams et al., 2009). In this study, personnel selected from all service branches were randomly assigned to the Drinker's Check-Up program (a brief motivational interview that included personalized feedback about drinking; n=1,483), the Alcohol Savvy program (an alcohol use disorder prevention program developed for workplace delivery; n=688), or a no-treatment control group (n=919). Use of the Drinker's Check-Up was found to be associated with significantly better drinking-related outcomes during the 6-month follow-up period, whereas the Alcohol Savvy program was not. In evaluating mediating factors, the authors found that there was strong support for the effect of perceived descriptive norms concerning others' drinking on alcohol outcomes, but only the Drinker's Check-Up intervention had the expected effect on participants' perceptions of drinking norms. In fact, users of the Alcohol Savvy program began to perceive others as drinking more than they had prior to using the program.

Computer technology can help improve motivation for treatment. Lieberman and Massey (2008) evaluated an online motivational intervention with 244 people whose drinking had been identified as problematic. Prior to intervention, 46 participants had stated that they were very interested in some form of treatment for their drinking, and 69 people said they were somewhat interested; after the intervention, those numbers rose to 68 and 90, respectively. Computer or Internet approaches offering early intervention for illicit drug use are less common than those for alcohol. Ondersma et al. (2007) evaluated a brief motivational intervention to reduce illicit drug use among postpartum women. For the evaluation, 107 women who had recently delivered children at a large urban hospital were randomly assigned to receive the 20-minute computer-based intervention along with some printed educational materials or to participate in an assessment-only control group. At a 4-month follow-up assessment, women in the control group had increased their drug use, but women who received the intervention had decreased use; for drugs other than marijuana, decreases were significant (p<0.05).

Use in the Treatment of Alcohol Use Disorder and Problem Drinking

A number of Web-delivered interventions for problem alcohol use are available; some overlap with interventions for alcohol prevention or early intervention and have thus been discussed previously. Additionally, some interventions address both alcohol and illicit drug use and are discussed under "Use in the Treatment of Illicit Drug Use Disorders." Interventions that target clients with a diagnosable alcohol use disorder are somewhat less common. Such interventions, though, have the potential to reach clients who might not otherwise seek treatment (Lieberman & Huang, 2008). Vernon (2010) reviewed eight studies of online treatments for problematic alcohol use in nonclinical samples. None of the studies were limited to individuals with alcohol use disorders, but those studies that did provide information on alcohol consumption suggested that clients were consuming amounts similar to those seen in standard treatment settings, although other data suggested that participants were experiencing fewer negative consequences than typically seen in standard treatment settings. With one exception, participants showed significant improvements in at least one outcome measure, but given wide variations in measures, types of

interventions, and varied use of control groups, it was not possible to draw conclusions about the relative effectiveness of the interventions studied.

Squires and Bryant (2010) reviewed research on six different TAC interventions for problematic alcohol use/alcohol use disorders. They found that, in general, these interventions achieved reductions in alcohol consumption and/or alcohol-related problems, but most had only preliminary/modest data supporting their use. Only two interventions reviewed are available commercially: the Behavioral Self-Control Program for Windows and the Drinker's Check-Up.

Dutch researchers compared a Web-based, therapist-delivered intervention (n=68); a fully automated, Web-based self-guided intervention (n=68); and a waitlist control group (n=69). Using an intent-to-treat analysis, they found that outcomes were significantly better for participants in the therapist-delivered intervention than for those in the self-guided intervention and significantly better for participants in the self-guided intervention than for those in the control group (Blankers et al., 2011).

Interventions to reduce alcohol use/treat alcohol use disorders can also be implemented in medical settings. Hasin et al. (2013) evaluated a phone-based intervention (HealthCall) that used interactive voice response technology plus motivational interviewing to reduce heavy drinking among primary care patients with HIV (N=258). The intervention was associated with significantly fewer drinks per day in comparison with a treatment-as-usual control group and fewer, but not significantly so, drinks per day in comparison with motivational interviewing alone. However, when only those participants who had alcohol dependence were included (about half the sample), use of the phone-based intervention was associated with significantly fewer drinks per day than motivational interviewing plus standard treatment as well as standard treatment alone.

Hasin et al. (2014) evaluated a version of HealthCall adapted for smartphones with a group of 41 people being treated for HIV who had alcohol dependence and compared results with 43 individuals with alcohol dependence who used the standard phone-based version of the intervention, who had been included in the Hasin et al. (2013) study. Participants used HealthCall on significantly more days when it was available on smartphones than on standard phones, but there were no significant differences in the number of drinks per day.

Dulin, Gonzalez, and Campbell (2014) conducted a pilot test (N=28) of another smartphone intervention known as Buddy Steps, which helps reduce alcohol consumption in people with less severe alcohol use disorders. Buddy Steps was designed to enhance motivation for change, help participants avoid high-risk situations, improve social support networks, assist participants in managing cravings, enhance problem-solving skills, promote engagement in nondrinking activities, and teach assertive communication skills. Participants significantly decreased heavy drinking (from 46 percent of their days prior to treatment to 25 percent while using the program) and reduced the average drinks per day by 25 percent.

Barnett, Tidey, Murphy, Swift, and Colby (2011) reported on a small (N=20) trial that evaluated a contingency management intervention to reduce alcohol consumption that used a Secure Continuous Remote Alcohol Monitoring (SCRAM) ankle bracelet. The SCRAM anklet is locked onto the ankle and has sensors that evaluate ethanol vapor from the skin to assess alcohol use as

well as tampering. Participants received cash incentives for days of abstinence following 1 week of normal drinking. In the second and third week of the study, participants had significant reductions in days abstinent and in measures of average and peak alcohol concentration.

Cognitive bias modification software (see the "Interventions to Reduce Trait Anxiety and Subclinical Anxiety Symptoms" section) has also been used with clients who have alcohol use disorders; preliminary research suggests that it is effective in altering clients' attitudes toward alcohol and alcohol-related cues, but more data are needed to determine how changes in attitudes translate into behavioral changes (Wiers, Eberl, Rinck, Becker, & Lindenmeyer, 2011).

Cunningham and Van Mierlo (2009) provided a different type of review of studies of Web-based interventions for problem drinking/alcohol use disorders, focusing not on results, but rather on positive and negative aspects of study design. Among the problems they identified with research to date on this type of intervention are difficulties in generalizing results to real-world settings, reliance on self-selection for samples, lack of suitable control groups, and poor follow-up rates.

Video conferencing-based group therapy has been used for people with alcohol use disorders. In a pilot study, the intervention was well-received by participants and had a relatively high level of attendance and low level of attrition (Frueh, Henderson, & Myrick, 2005). Many interventions for alcohol use disorders or problem drinking have high dropout rates (Vernon, 2010). On the plus side, Dutch research indicates that a Web-based program for problem drinking attracted clients who might not otherwise seek treatment (Postel, De Haan, & De Jong, 2010).

Use in the Treatment of Smoking/Smokeless Tobacco Use

Interventions that use modern communication technology to help people stop using tobacco (either smoked or smokeless) are relatively widespread and able to reach a large client population in a timely and cost-effective manner (Leykin, Barrera, & Muñoz, 2010). Research and numerous reviews of phone- and Web-based interventions for smoking cessation have generally found the interventions to be effective, especially compared with no-treatment controls or printed materials (Chen et al., 2012; Myung, McDonnell, Kazinets, Seo, & Moskowitz, 2009; Shahab & McEwen, 2009; Stead et al., 2007; Whittaker et al., 2012). Most Web- and phone-based smoking cessation studies, however, do rely on self-report for evaluating smoking rates, which may mean that such research undercounts the amount of actual smoking (Kiluk et al., 2011). However, An, Klatt, et al. (2008) found a relatively low underreporting rate when they used carbon monoxide tests to confirm self-reports.

Phone-based interventions

Phone-based interventions such as quitlines are widely used and well-evaluated. A few large-scale reviews have been conducted that support the effectiveness of quitlines and other phone-based counseling services for smoking cessation (Fiore, Bailey, & Cohen, 2000; Lichtenstein, Glasgow, Lando, Ossip-Klein, & Boles, 1996; Stead et al., 2007; Tzelepis, Paul, Walsh, McElduff, & Knight, 2011). Quitlines—in which a caller initiates a request for help with cessation—are available in all 50 states, plus Puerto Rico and the District of Columbia (Cummins et al., 2007). A review of the 52 U.S. quitlines (Cummins et al., 2007) found that most are capable of handling calls in more than one language (with a mean of two languages), receive calls a mean of 97 hours per week, and provide counseling services for a mean of 86 hours per week.

All of the U.S. quitlines provide some form of multisession counseling, with 61.5 percent allowing for follow-up sessions initiated by the caller and 28.8 percent providing proactive follow-up (i.e., calls initiated by the counselor). These quitlines offer a mean of five sessions of counseling, with a typical first session lasting about 30 minutes and follow-up sessions lasting about 17 minutes. Approximately one third (34.6 percent) also provide free nicotine replacement medications. From 2004 to 2005, approximately 1 percent of people who smoked in the United states called such quitlines; the rates for particular states varied from .01 to 4.28 percent, with a strong correlation between the amount of funding for the state's quitline and the percentage of people who smoked in the state who used it. In general, researchers have not investigated different components of quitlines, but in an update of a meta-analysis originally conducted for the Cochrane Collaboration, Stead et al. (2007) determined that quitlines that provided proactive counseling increased the odds of successful smoking cessation 1.41 times (95 percent confidence interval [CI]: 1.27–1.57).

In a meta-analytic review of 24 randomized controlled studies specifically involving proactive telephone counseling for smoking cessation, Tzelepis et al. (2011) concluded that, compared with mutual-help materials or no-intervention control groups, such interventions were associated with significantly better point prevalence abstinence outcomes 6 to 9 months after study entry, but not 12 to 15 months after. Compared with no-treatment and mutual-help material controls, such interventions were also associated with significantly higher rates of 3 or more months of continuous abstinence at both 6 to 9 months and 12 to 15 months after entry. Study quality and recruitment methods did not affect results in regard to point prevalence abstinence, but studies of worse quality were associated with higher rates of continuous abstinence at 6 to 9 months, although not at 12 to 15 months. Quitlines and telephone-based cessation counseling also appear to be effective for young adults, a population difficult to reach with cessation initiatives (Rabius et al., 2004; Sims et al., 2012).

Mobile phone interventions

Mobile phones can also be used in smoking cessation efforts, typically using text messages or video instead of audio communication. Whittaker et al. (2012) reviewed five randomized or quasi-randomized trials that provided at least 6 months of follow-up data on mobile phone interventions (including Free et al., 2011). They found that such interventions were associated with significantly higher rates of abstinence from smoking for 6 months or more compared with control conditions. However, results varied a good deal across studies, with much stronger results from three of the five studies than from the other two.

Three of the studies included in the Whittaker et al. (2012) review used the TXT2STOP program (which involves sending text messages to mobile phones), as delivered in either New Zealand or Great Britain. In the most recent of these studies, Free et al. (2011) randomly assigned 5,800 individuals who smoked to receive regular, automated, tailored text messages sent as part of the TXT2STOP program or to receive regular messages thanking them for their participation (the control group). They found those who used TXT2STOP were significantly more likely to have biochemically verified continuous abstinence for the 6-month follow-up period than were participants in the control group, and this held true when participants lost to follow-up were counted as smoking. For more information on TXT2STOP, see Part 1, Chapter 1 of this TIP.

As might be expected, not all aids for smoking cessation can be considered adequate. Abroms, Padmanabhan, Thaweethai, and Phillips (2011) reviewed iPhone applications sold as cessation aids and found that few, if any, complied with recommended guidelines.

Web-based interventions

A variety of Web-delivered interventions have been developed to help individuals quit smoking (see description of major cessation Web sites in Leykin et al., 2010). In general, such interventions have been found to be effective, but the evidence supporting their use is not as strong as the evidence supporting the use of telephone-based interventions (Chen et al., 2012; Leykin et al., 2010; Myung et al., 2009; Shahab & McEwen, 2009; Zbikowski et al., 2008). Web and phone technology can also be combined, which may improve effectiveness (Brendryen, Drozd, & Kraft, 2008; Graham et al., 2011; Zbikowski et al., 2008). Web-based cessation programs also appear to provide effective assistance for people trying to quit smokeless tobacco (e.g., Severson, Gordon, Danaher, & Akers, 2008).

In a comprehensive meta-analytic review, Chen et al. (2012) reviewed 77 publications reporting on 60 randomized or quasi-randomized controlled trials involving computers and other electronic aids, including automated mobile phone applications (but not counseling by phone), for adult smoking cessation. The authors concluded that, overall, such interventions increase the odds of achieving cessation to a small degree over no treatment or generic self-help materials and that factors such as the concurrent use of other, nonelectronic interventions and the specific mode of delivery do not affect those odds significantly. However, they concluded that such interventions are still highly cost-effective.

Shahab and McEwen (2009) reviewed 11 randomized controlled trials of Web-based interventions published between 2005 and 2008 and concluded that tailored, Web-based interventions were more effective than printed psychoeducational materials or email interventions and that their impact is similar to that of telephone intervention or physician advice. The authors noted that research generally indicates that only those interventions that are aimed at people who smoke but are already motivated to quit are effective. Another meta-analytic review of 22 interventions from around the world (9 Web-based and 13 other computer-based) also concluded that these interventions, regardless of whether they used the Internet, were significantly more effective than control groups; their use was associated with cessation rates similar to those seen in studies of in-person cessation counseling (Myung et al., 2009). The authors found that, for the seven studies that provided long-term follow-up data (i.e., 1 year or more), the cessation rate for users of a Web-based cessation program was 9.9 percent (95 percent CI: 8.9–10.9) compared with 5.7 percent for control groups (95 percent CI: 5.1–6.3).

Leykin et al. (2010) provided a more informal but far-ranging review of research on smoking cessation programs delivered via the Internet. They summarized research and briefly described 25 such Web sites from around the world. More recent studies by other researchers have continued to find Web-based cessation programs effective at increasing abstinence, especially compared with information-only (Graham et al., 2011) or assessment-only (Haug, Meyer, & John, 2011) control groups.

Contingency management has been used to improve abstinence rates in an online smoking cessation program for people in rural areas. Stoops et al. (2009) compared outcomes for 35

people who smoked and received monetary incentives contingent on providing breath carbon monoxide samples (while on camera to ensure no false samples) indicating abstinence from smoking with a control group of 33 who received monetary incentives regardless of their abstinence status. Individuals in the abstinence-contingent group were significantly more likely to be abstinent during the 6-week intervention.

Dallery and Raiff (2011) discussed some concerns involved in using contingency management in Web-based interventions for smoking cessation. For example, they emphasized the importance of intensive monitoring and frequent reinforcement during the initial days and weeks of quit efforts, as these early periods of cessation efforts are often the most difficult for those trying to quit; the ability to maintain abstinence throughout the early period increases the likelihood of long-term treatment success.

Not all Web-based cessation programs have been found to be effective. For example, McKay, Danaher, Seeley, Lichtenstein, and Gau (2008) found no significant differences in cessation, at both 3- and 6-month posttreatment assessments, between individuals (N=2,138) randomly assigned to the Quit Smoking Network smoking cessation program and those assigned to a Web-based exercise program that gave some encouragement to quit smoking. The authors attributed the lack of a significant effect to a small number (i.e., one) of median visits to the site for participants and to a high dropout rate (approximately 61 percent by the 6-month assessment).

Many individuals searching for information about or help with smoking cessation may be reaching Web sites that are not helpful (e.g., sites run by tobacco companies, sites that use unproven methods; Bock, Graham, Whiteley, & Stoddard, 2008; Etter, 2006). Bock et al. (2008) found that only 26 percent of the sites found in searches for smoking cessation information were actually intended for that purpose, and 31 percent of those had at least some inaccurate information.

Tailored content

Researchers have found that Web-based smoking cessation programs that are able to tailor their content to the individual user have significantly better outcomes than those that present static content, although not for every population (Rabius, Pike, Wiatrek, & McAlister, 2008; Strecher et al., 2008; Strecher, Shiffman, & West, 2005). A study comparing outcomes for 2,468 individuals who were randomly assigned to use one of six smoking cessation Web sites and for whom 13-month follow-up data were available found that outcomes for those using interactive or tailored sites were not significantly better for participants as a whole, but when individuals who had symptoms possibly indicative of depression (and who also had significantly worse outcomes) were removed from the sample, the use of more interactive sites was associated with a significantly (p=.04) higher cessation rate at the follow-up assessment (Rabius et al., 2008).

Severson et al. (2008) compared two versions of the ChewFree Web site (https://chewfree.com), one providing tailored feedback based on interactions with users and another using a more static and linear approach. Participants who used the interactive site had significantly higher rates of abstinence from all tobacco products at both 3- and 6-month postintervention assessments. Similarly, Strecher et al. (2005) evaluated 3-month cessation rates for 3,971 individuals in Great Britain and Ireland who were randomly assigned to use either a tailored or a nontailored smoking cessation Web site (while also using a nicotine patch) and found that those who had the tailored

intervention were significantly more likely to report 10 or more weeks of continuous abstinence from tobacco use. They also found that the perceived relevance of the cessation program, assessed 6 weeks after starting the program, was a partial mediator of outcomes that might account for better results for those using the tailored intervention.

In another study, Stretcher et al. (2008) evaluated 6-month outcomes for 1,866 people who used a smoking cessation Web site where five different factors (the depth of tailoring of messages relating to outcome expectations, the detail of success stories provided to the user, the detail and amount of attention paid to the user's perceived barriers to cessation, the degree of personalization in the introductory session, and the schedule for exposure to key elements of the Web site) were randomized in 16 different combinations. The authors found that the detail provided in success stories and the depth of personalization in messages relating to outcome expectations were both significantly related to cessation outcomes ($p<0.04$ and $p<0.02$, respectively). Also, the detail of success stories interacted with the participant's education level, so that for individuals with less than a high school education (but not those with a greater level of education), highly tailored success stories had a significant relation to outcomes.

Research suggests that messages should be tailored to the client's stage of readiness for tobacco cessation to maximize effectiveness (Etter, 2005). Although it is not as common as Web-based interventions, delivery of tailored content by email is also possible. Dutch researchers found that individuals who smoked and received tailored email messages regarding cessation ($n=224$) reported significantly higher past-week cessation rates than did those who received generic, nontailored emails ($n=234$) and reported greater appreciation for the intervention and a stronger belief in its credibility as well (Te Poel et al., 2009).

Targeted populations

Cessation sites can target specific populations. For example, the RealU site was developed for students at the University of Minnesota. In an evaluation of the site, An, Klatt, et al. (2008) randomly assigned students who had previously reported smoking cigarettes in the prior month to a control group that received a confirmation email that included links to online health resources or to an intervention group that paid participants with gift vouchers to motivate them to sign on to the study Web site once a week. At the site, they would report on health and lifestyle factors, take an interactive quiz on smoking-related or general interest topics, view a student-written online magazine that included at least one article on smoking or smoking cessation in college, and receive weekly emails from peer coaches. The rate of past-month abstinence reported at a 30-week assessment was significantly higher for those who participated in the intervention; carbon monoxide tests showed a low rate of underreporting, but the difference in abstinence rates between the two groups was no longer significant at a 6-month assessment.

Another smoking cessation intervention targeting college students using both Internet and mobile phone text messages was found to have a high success rate in a small ($N=31$) study of students who smoked on a daily basis (Riley, Obermayer, & Jean-Mary, 2008). The authors found that 6 weeks after beginning the intervention, 45 percent of participants reported past-week abstinence from smoking, and 42 percent had prior-week abstinence according to biochemical validation.

Another cessation intervention that uses computer technology targeted toward a specific population is a program at the University of Texas M. D. Anderson Cancer Center, which uses

Web-based screening of new cancer patients to identify those who currently smoke as well as telephone technology to conduct treatment sessions with healthcare providers (Mallen, Blalock, & Cinciripini, 2006). Preliminary findings from the program evaluation suggested that the program was effective at significantly reducing tobacco use.

Jones et al. (2010) conducted a pilot test of a Web-based smoking cessation site for people who are Deaf, which included features such as an online video chat room for sign language discussions among participants and a trained moderator. The program was well-received by a small group (N=5) of participants.

Brunette et al. (2011) conducted a pilot study of a computer-based intervention intended to help motivate people with serious mental illness to quit smoking (N=41). They used a convenience sample and assigned participants to the intervention or to a waitlist control group. Those who used the intervention were significantly more likely to show some motivation to quit (e.g., talking to a counselor about cessation, starting a cessation program) and to show multiple signs of motivation than were members of the control group. A later evaluation of this program, involving 128 people with serious mental illness who smoked, found that 32 percent began recommended treatment after using the system; 51 percent engaged in cessation-related behavior (Ferron et al., 2012). In a model that controlled for smoking behavior and other factors (e.g., cognitive functioning), self-reported readiness to quit was the only variable significantly associated with cessation behavior in the 2 months following use of the site.

Web site components

Because smoking cessation Web sites typically include multiple components, An, Schillo, et al. (2008) evaluated the use of different features of the QuitPlan smoking cessation site (https://www.quitplan.com) and their relationship to outcomes for 607 registered users of the site. The features evaluated were:

- Interactive quit planning tools (used by 77 percent of study participants).
- Other informational resources, such as the quit guide and medication guide (used by 60 percent).
- Passive community interaction (e.g., reading other members' journal posts, viewing the discussion board; used by 38 percent).
- Interactive diagnostic tools (used by 34.7 percent).
- Active community engagement (e.g., posting to discussion board, writing journal entries; used by 24 percent).
- One-on-one messaging (used by 11 percent).
- Online counseling (used by 5 percent).

At a 6-month follow-up assessment, 9.7 percent of participants had been abstinent from smoking for 1 month or more according to self-report. The authors found that people who used the quit planning tools more than once were more likely to be abstinent; those who used them two or three times were 1.87 times more likely, and those who used them four or more times were 2.35 times more likely. The use of one-on-one messaging was also associated with increased odds of being abstinent at the 6-month assessment, but the difference was not significant.

Another possibly helpful feature of smoking cessation programs is the use of peer support through an online bulletin board or a similar mechanism, which can enable more rapid response

to participant problems/concerns than can be provided by staff members alone (Selby, Van Mierlo, Voci, Parent, & Cunningham, 2010). Stoddard et al. (2008) compared two versions of the same Web site (http://www.smokefree.gov), one of which had an online discussion or bulletin board and the other of which did not. They randomly assigned 1,375 participants to use one of the two sites, and although those who used the site with the bulletin board did spend significantly more time on the site, doing so did not translate into significantly better outcomes, perhaps because only a small percentage of those participants (11.8 percent) chose to view or post messages.

Adding a phone component to a Web-based intervention may also improve outcomes. In a large (N=2,005) evaluation of three different formats of the Quit Using Internet and Telephone Treatment, Graham et al. (2011) randomly assigned people who smoked to use a basic, static Web site; an enhanced Web site that was interactive in format; or an advanced site with the addition of proactive phone calls from trained counselors. Although past-month abstinence rates at a final assessment 18 months after the intervention did not vary significantly, participants who used the enhanced site and received counselor phone calls were significantly more likely than those in the other groups to have been abstinent at all assessments (conducted at 3, 6, 12, and 18 months); those who used the enhanced site without phone calls were significantly more likely than those who used the basic site to have been abstinent at all assessments.

Automated interventions

Despite some smoking cessation interventions making use of human counselors, others are fully automated, and automated interventions have been found to be significantly more effective than no-treatment controls (Balmford, Borland, & Benda, 2008; Swartz, Noell, Schroeder, & Ary, 2006). For example, Swartz et al. (2006) found that at a 90-day postintervention assessment, the past-week cessation rate for participants using a fully automated site was more than twice as high (12.3 percent) as that in a no-treatment control group (5 percent). Mobile devices have also been used for automated cessation interventions. A large (N=5,524) trial conducted in Great Britain compared an automated text messaging intervention delivered via mobile phone with a control group who received text messages unrelated to smoking cessation (Free et al., 2011). Participants who received the intervention were significantly more likely to have been continuously abstinent, as verified using saliva cotinine testing, for 6 months (10.7 percent) than were those in the control group (4.9 percent).

Brendryen et al. (2008) reported on a Norwegian program that used automated email, Web, interactive voice, and text messages (all accessed using cell phones). Compared with a control group who only received printed materials about cessation, those in the intervention group had significantly higher repeated point abstinence rates during the 1-year program.

Some studies have found that interactive Web-based interventions, which can provide tailored feedback, can have a significant positive effect on smoking outcomes and are more effective than self-guided interventions using printed materials or email, but evidence is mixed regarding their effectiveness relative to static Web-based interventions (Shahab & McEwen, 2009). Shahab and McEwen (2009), in their review of Web-based cessation programs, concluded that evidence is stronger for the effectiveness of interactive interventions than for static ones, but they also noted that specific studies included in their review had greatly varying results and varied considerably

in terms of their specific components. Other research found higher abstinence rates for people receiving counselor contact, dependent on the type and form of contact (Graham et al., 2011).

Other factors affecting outcomes

An Australian study evaluated demographic factors associated with Web site use for 28,247 users of the Quitcoach smoking cessation site (http://www.quitcoach.org.au; Balmford, Borland, Li, & Ferretter, 2009). Compared with Australians who smoked in general (according to a separate general population survey) and users of the Quitline service (a service that offers cessation advice by phone), users of the Web site were more likely to be male and were, on average, younger. Compared with Quitline users alone, Quitcoach site users were more likely to have attempted quitting before, were less likely to use pharmacotherapy, and were less likely to smoke 30 or more cigarettes per day. According to another study of Quitcoach data, women, older adults, and people using pharmacotherapy were significantly more likely than others to return to the site after an initial viewing (Balmford et al., 2008).

Zbikowski et al. (2008) evaluated the Free & Clear Quit for Life Program, a large (N=11,143) cessation intervention that offered both phone- and Web-based services. They found that women were significantly more likely than men to use both the phone and Web components of the program, people ages 26 and older who smoked were more likely to use both than were those under 26, and individuals who smoked moderately (15 to 20 cigarettes a day) were more likely to use them than those who smoked on a light or heavy basis. Clients who completed a greater number of phone counseling sessions and those who used the Web-based component on at least one occasion were significantly more likely to report successful tobacco cessation at a 6-month postintervention follow-up after controlling for age, gender, and cigarettes smoked per day. For each completed call, the odds of successfully quitting increased by 56 percent; for each time the individual logged in and used the Web-based component, those odds increased by 14 percent. The overall successful cessation rate for respondents to the 6-month follow-up survey was 41 percent; if nonresponders were factored in as participants who had not achieved cessation, the rate would have been 21 percent.

In another study, users of a Web-based smoking cessation program developed at the University of Michigan were assigned to have access either to the Web site as a whole or to specific parts of it on a sequential basis (Strecher et al., 2008). The authors found that participants were less likely to engage with the site (defined as opening more parts of the Web site) if they were male, were under 40 years of age, and had no higher education. Participants who were provided with more personalized feedback on how to deal with barriers to successful cessation (based on factors such as their home environment, family life, stress/coping skills, and level of physical activity) were more likely to view more parts of the Web site.

Brendryen et al. (2008) evaluated possible mediators for the effectiveness of a Norwegian Web-based smoking cessation program (Happy Ending). None of the factors evaluated mediated long-term cessation, but coping planning skills and self-efficacy were partial mediators for abstinence at an assessment 1 month after each participant's quit date. Similarly, Danaher, Smolkowski, Seeley, and Severson (2008) evaluated possible mediators for successful abstinence from the use of smokeless tobacco for participants in the ChewFree Web-based program. They found that program exposure did not mediate positive outcomes when self-efficacy was also considered, suggesting that self-efficacy was a more important mediator than program exposure. They

hypothesized that a certain degree of program exposure could increase self-efficacy, thus leading to better outcomes, but they noted that it is also possible that individuals with greater self-efficacy are more likely to engage with the program.

Co-occurring mental and substance use disorders may also affect cessation for Web-based program users. In a bilingual international program, past, but not current, major depression was associated with significantly higher cessation rates, whereas current depression was associated with significantly lower rates (Muñoz et al., 2006). Similarly, in a multisite trial, individuals who reported at least one symptom indicative of possible depression had significantly worse cessation rates at a follow-up assessment 13 months after study entry (Rabius et al., 2008).

Research concerns

One problem with a great deal of research on Web-based smoking cessation is that interventions often have high rates of attrition, and this may skew some of the data presented in the studies thus far considered (Kiluk et al., 2011; Webb, 2009). For example, among studies reviewed by Shahab and McEwen (2009), anywhere from 7 to 73 percent of participants were lost to follow-up. Saul et al. (2007) made a special effort to lower attrition by using the telephone as well as email for surveys and providing cash incentives for survey completion, but they still obtained only a 77.6 percent response rate for their 6-month follow-up survey.

Also, most cessation rates in research on Web- and phone-based tobacco cessation programs are based on participant self-report, which may inflate rates somewhat. A New Zealand Web-based cessation program (Smokestop) used carbon monoxide tests 1, 3, and 6 months after program entry to confirm reported cessation rates and found that 12 percent of participants (n=12) achieved 6 months of continuous cessation (a percentage comparable with other studies; Fraser, McRobbie, Bullen, Whittaker, & Barlow, 2010). However, the program began with an initial 30-minute in-person interview to instruct participants in use of the Web site and also provided free nicotine replacement (as some American Web-based programs also do). Graham and Papandonatos (2008) found that results from Web-administered smoking surveys (of the kind typically used in the research thus far described) did not differ significantly from telephone-administered surveys, and, more importantly, the race/ethnicity and income level of respondents did not significantly affect the psychometric properties of such instruments.

Another potential problem in research on Web-based interventions that was raised by Danaher, Lichtenstein, McKay, and Seeley (2009) is the use of additional smoking cessation aids that were not recommended or assigned as part of the study. In their analysis of 1,028 participants in a Web-based randomized clinical trial, 24.1 percent of participants used methods that were not part of the study (12.6 percent consulted books/pamphlets, 4.5 percent used hypnotherapy or acupuncture, 2.3 percent used outside group counseling, and 1.7 percent used outside individual counseling). The authors recommended that studies evaluating Web-based smoking cessation interventions view them as part of a larger network of behavioral change efforts for participants and that study participants be asked to identify other factors involved in those efforts.

Little research has been conducted evaluating cultural differences in the use of Web-based smoking cessation programs, but one study that evaluated outcomes from an international group of Spanish (n=500) and English (n=500) speakers did not find any significant differences in outcomes between the two groups. In other research conducted involving the same program,

Muñoz and colleagues (2006) found that Spanish-speaking participants were more likely to be male than female, whereas the reverse was true for English speakers; Spanish speakers also had a higher mean level of education. However, these differences likely reflect differences in smoking and Internet access among the two groups.

Use in the Treatment of Illicit Drug Use Disorders

Moore et al. (2011) reviewed 12 studies of moderate quality that evaluated computer-based interventions for drug use disorders, most using onsite computers and 11 including active controls (typically, treatment as usual). They concluded that such interventions are more effective at reducing substance use during treatment than are control conditions (such as treatment as usual) and that they continue to be effective afterward. Also, these studies suggested that these interventions are well-received by clients and that clients using them have levels of engagement and retention similar to levels seen in clients receiving traditional treatments.

Carroll et al. (2008) gave early results from a randomized trial of a multimedia computer-delivered CBT treatment for substance use disorders known as CBT4CBT. Individuals who received the intervention in addition to standard treatment (n=35), compared with those who received standard treatment alone (n=38), provided significantly more urine samples that tested negative for drugs. In addition, for those who received the intervention, there was a stronger association between outcome and treatment engagement; completion of homework assignments was a significant predictor of treatment engagement, highlighting the importance of homework completion for those receiving this intervention.

In a later article, Carroll et al. (2009) provided 6-month follow-up outcomes for 73 of the original 77 participants. In that assessment, the authors found that, after controlling for treatment retention, posttreatment outcomes, and exposure to other treatment during follow-up, individuals who received the intervention tended to continue to reduce their drug use over the follow-up period, whereas those who were in the control group tended to increase it during that period. In another analysis of these data, Sugarman, Nich, and Carroll (2010) found no significant differences in the use of coping strategies between the intervention and control groups, but they did find a significant association between the use of coping strategies and decreased use of drugs and observed that the strength of this association was stronger for those participants who used CBT4CBT. Kiluk, Nich, Babuscio, and Carroll (2010) reanalyzed the data for 52 participants who completed all assessments and found that those who had the additional CBT4CBT treatment had significantly greater improvements (according to independent ratings of role-plays) than did those receiving standard treatment alone. Also based on these data, Olmstead, Ostrow, and Carroll (2010) calculated the additional cost of using CBT4CBT to be $39 for programs and $27 for patients and calculated that the program would be cost-effective if the perceived value of one drug-free urine specimen were $21 or greater.

Carroll et al. (2014) conducted a randomized trial comparing CBT4CBT with standard treatment alone for 101 individuals in a methadone maintenance program who had cocaine dependence. Participants who used the CBT4CBT program were significantly more likely to have 3 or more consecutive weeks of cocaine abstinence during the 8-week trial than were those in the control group (36 percent of the CBT4CBT group had 3 or more weeks of abstinence compared with 17 percent of the control group). In addition, CBT4CBT groups had better, but not significantly so, outcomes in other areas, including more urine samples free of all drugs. When considering only

those participants who completed the trial (n=69), the results were significantly better for those who used CBT4CBT.

Internet-based video conferencing has been used to conduct group therapy for clients in methadone maintenance who were required to enter stepped-up treatment as a result of testing positive for illicit drug use (King et al., 2009). In the pilot evaluation of the program, 37 clients were randomly assigned to a standard in-person group at the methadone maintenance facility or to an online group that used group counselors who were experienced in providing treatment using this technology. The authors found no significant differences between the two groups in terms of achieving the 2 consecutive weeks of abstinence required before participants could leave stepped-up care. Although treatment satisfaction was comparably high for participants in both treatment conditions, all of those in the online group who responded to the question said they would prefer to use it over the traditional group.

Computer and telephone interventions have also been developed for clients receiving buprenorphine treatment. Bickel, Marsch, Buchhalter, and Badger (2008) randomly assigned 135 clients with opioid dependence who were also receiving buprenorphine to one of three groups: a computer-assisted community reinforcement intervention with contingency management using vouchers, the same treatment delivered only in person, or a standard counseling approach (reflecting treatment provided in methadone maintenance programs). Participants were followed for 23 weeks of treatment, and retention rates were comparable across the three groups (62 percent retention for the computer-assisted care, 58 percent for the standard care, and 53 percent for the in-person intervention groups). The authors found that participants in both intervention groups had significantly more (p<.05) weeks of abstinence from cocaine and opioids (according to thrice-weekly urine drug screens) than did those in the control groups and comparable mean amounts of continuous abstinence (7.98 weeks for those who received the in-person intervention and 7.78 weeks for those who received the computer-assisted intervention). However, the computer-assisted intervention required considerably less time from therapists, as 80 percent of the intervention was delivered by the computer program.

Ruetsch, Tkacz, McPherson, and Cacciola (2012) provided follow-up data for 1,426 patients receiving buprenorphine who were randomly assigned to receive either standard care or standard care plus a telephone-based support program (HereToHelp), which involved calls from care coaches who gave information and encouragement but not counseling. At assessments 1 year after beginning the program, participants who received HereToHelp and accepted at least three phone calls were significantly more likely to be compliant with their buprenorphine treatment, and participants who were compliant with treatment had significantly better outcomes according to all seven scales of the ASI. The authors concluded that intervention has a positive effect on substance use, mental health, and other outcomes indirectly by improving compliance. See Ruetsch, Cacciola, and Tkacz (2010) for more information on the specifics of the intervention.

In another study, 160 participants in a methadone maintenance program were assigned to receive standard treatment either alone or with the addition of a Web-based intervention based on the community reinforcement approach (Acosta et al., 2012). The researchers evaluated the effects of cognitive functioning on treatment response for participants in the two groups. They found that a number of measures (subscales of the Short Form of the MicroCog Assessment of Cognitive Functioning) representing greater impairment in different areas of cognitive

functioning were associated with significantly lower levels of abstinence for recipients of standard care alone, but not for those who received the additional Web-based intervention. They observed that this finding may indicate that Web-based interventions can help reduce the negative effects of impaired cognitive functioning on substance use disorder treatment outcomes.

Specialized treatment programs that use computer/Internet technology can also be created for specific underserved populations. For example, SAMHSA funded a Web-based substance use disorder treatment program for people who are Deaf that was able to successfully treat this underserved population. According to preliminary data, 66.7 percent of 36 participants reported no past-month alcohol use, and 63.9 percent reported no past-month illicit drug use at a 6-month follow-up assessment (Moore et al., 2009). A couple of computerized interventions have also been evaluated for the treatment of cannabis use disorders. A pilot study comparing computerized treatment using motivational enhancement therapy, CBT, and abstinence-based contingency management (n=16) with a similar treatment delivered by therapists (n=22) found no significant differences between the two groups in terms of attendance, retention, or cannabis use outcomes evaluated 12 weeks after the intervention. In both groups, rates of daily use dropped sharply from 4 out of every 5 days (roughly 80 percent) to 1 out of every 9 days (roughly 11 percent), but rates of continuous abstinence for 10 to 12 weeks were low (about 30 percent for the group delivered the CBT by the computer and about 18 percent for the group with therapists delivering the CBT; Budney et al., 2010).

In a German study, Tossmann, Jonas, Tensil, Lang, and Strüber (2011) compared outcomes for users of a 50-day Web-based treatment for cannabis use disorders (n=360, 100 of whom completed the intervention and provided appropriate data) with those for individuals assigned to a waitlist control group (n=360, 106 of whom provided full data). Participants who used the intervention had significantly greater reductions in cannabis use than did those in the control group. In addition, the intervention had small-to-moderate effects on a number of secondary outcomes, including self-efficacy, life satisfaction, anxiety, and depression. VanDeMark et al. (2010) evaluated factors associated with active engagement for users of an online substance use disorder treatment intervention (E-TREAT), a motivational interviewing approach where clients worked with a recovery coach using a variety of communication methods (including telephone, email, text messages, and Web-based communication). Clients were more likely to engage in the program if they were female, had children, reported a positive relationship with their recovery coach, and had not completed a substance use disorder treatment program in the past.

Use in Continuing Care/Symptom Monitoring for Substance Use Disorders

Telephone and Internet technologies have been used in continuing care for people with substance use disorders for some time and to a fairly large extent, but much of this use is informal; few studies have evaluated the use of these technologies. Gustafson, Boyle, et al. (2011) reviewed randomized trials that use these technologies to provide continuing care for chronic diseases, including substance use disorders. They found that monitoring and proactive outreach by computer were particularly effective. However, small sample sizes and poor designs limit the conclusions that can be drawn. Both this article and another article (Gustafson, Shaw, et al., 2011) described Addiction-CHESS (A-CHESS), a mobile technology application intended to promote long-term recovery from substance use disorders by providing monitoring of recovery activities, decision-making tools, support services (including discussion groups and feedback

from experts), and information. This application is based on the CHESS system (see discussion under "Promoting Compliance, Engagement, and Retention") that has been found effective in promoting other kinds of behavioral change, including smoking cessation and the management of physical illnesses, such as asthma and HIV (Gustafson, Boyle, et al., 2011; Gustafson, Shaw et al., 2011).

More recently, Gustafson et al. (2014) conducted a randomized trial comparing treatment as usual for clients who attended a residential treatment program that did not feature coordinated care following treatment (n=179) with standard residential treatment with the addition of A-CHESS to help clients manage drinking following treatment (n=170). Participants who used A-CHESS reported significantly fewer days of risky drinking (i.e., consuming more than four standard drinks for men and three for women in a 2-hour period) than did those in the control group during the 4-month follow-up period (with means of 1.39 days and 2.75 days, respectively).

Telephone monitoring for continuing care following substance use disorder treatment has been found to be effective in a series of studies, particularly for clients who are not considered at high risk for relapse. McKay, Lynch, Shepard, & Pettinati (2005) compared 12 weeks of weekly telephone monitoring and brief counseling (consisting of a 15-minute call in which goals were reviewed, problems discussed, and new goals set) combined with 4 weeks of weekly supportive group sessions with either 12 weeks of twice-a-week CBT relapse prevention sessions or twice-a-week supportive group counseling with a group of clients who had completed an intensive outpatient treatment program (N=359). At assessments 24 months after the intervention, the authors found that rates of total abstinence were significantly higher for those who received telephone checkups compared with those who received standard group counseling for continuing care. However, further analysis revealed that, although clients who had low to moderate levels of risk for relapse (assessed using a composite risk indicator measure the authors developed based on other research; McKay, Lynch, Shepard, Morgenstern, et al., 2005) had overall higher abstinence rates when receiving telephone monitoring, those who were assessed as being at greater risk for relapse had higher overall abstinence rates in standard supportive group treatment. In another article, the authors noted that no other client characteristics, besides the composite risk for relapse, marked clients as unsuitable for telephone-based counseling (McKay, Lynch, Shepard, & Pettinati, 2005).

Another analysis from these researchers, which used data only from the telephone-based and supportive group interventions, tried to identify the mediating factors that might account for the better outcomes seen in telephone-based continuing care compared with standard supportive group counseling for continuing care (Mensinger, Lynch, TenHave, & McKay, 2007). Participants in the telephone-based intervention had greater involvement in mutual-help groups during follow-up than did those in standard care, and they also had higher self-efficacy scores and a greater commitment to abstinence at the 6-month follow-up assessment. The authors concluded that these factors accounted for higher overall abstinence rates among those who received the telephone-based intervention.

More recently, McKay et al. (2011) reported 2-year follow-up outcomes for 252 individuals with alcohol use disorders (49 percent of whom also had cocaine dependence) who had completed an outpatient treatment program and received standard continuing care consisting of a stepped-care

counseling program (*n*=86), telephone monitoring and feedback only (*n*=83), or a combination of the two (*n*=83) for 18 months. During at least some of the assessments conducted during the 18-month period while the intervention occurred, alcohol-related outcomes (e.g., use of any alcohol, days of heavy drinking) were significantly better for participants in the combined treatment group than in either of the other groups. Also, participants who received telephone counseling alone had significantly fewer days of alcohol use during months 10 through 15 than did those who received standard continuing care. However, at an assessment conducted 24 months after treatment started, differences in outcomes were no longer significant.

To reduce costs, telephone monitoring can also use interactive voice response systems, which have a computer-operated voice that asks questions and collects keypad responses from clients. Helzer, Badger, Rose, Mongeon, and Searles (2002) used such a system to collect 2 years of daily information from a sample of heavy drinkers who did not receive substance use disorder treatment services (*N*=33) about their alcohol consumption and found that this act of reporting by itself was associated with reductions in alcohol use. Stout et al. (1999) developed a continuing care intervention, known as Case Monitoring, that used a stepped-care approach to telephone monitoring. The intervention started with a 30-minute interview during treatment to establish rapport and identify problems that might lead to relapse and then involved counselor-initiated telephone contact that started 1 week after discharge and continued monthly for 3 months, then tapered to two contacts at 6-week intervals, followed by nine contacts at 2-month intervals (for a total of 15 contacts over 2 years for clients who were doing well). If a client was at risk for relapse or had already relapsed, then the contact schedule was restarted.

In their evaluation of this case monitoring process conducted with 342 clients, Stout et al. (2001) found that telephone monitoring was associated with fewer relapses and, to a greater extent, less severe relapses for those who did drink compared with a control group who received standard continuing care only. At the 3-year follow-up, people who received telephone monitoring had a significantly smaller percentage of days of heavy drinking (12 percent) compared with those in the control group (24 percent). The authors also found that the intervention was associated with savings in treatment costs after the first year.

Another approach to telephone monitoring for people in recovery from substance use disorders was evaluated in a series of National Institute on Drug Abuse Clinical Trials Network studies (Farabee et al., 2012; Hubbard et al., 2007; Karno, Farabee, Brecht, & Rawson, 2012). The Hubbard et al. (2007) study used telephone calls to encourage clients (*N*=339) to comply with continuing care plans, but the results failed to clearly evidence the intervention's efficacy when attendance at continuing care of those who received phone calls was compared with that of participants in the control group, who did not receive any phone calls. Farabee et al. (2012) developed a more elaborate telephone support program with phone referrals to continuing care conducted in four different styles (unstructured/nondirective, structured/nondirective, unstructured/directive, and structured/directive). Clients (*N*=301) were randomized to one of the four styles of telephone support or to a control group who received only a referral to continuing care. At 3-month follow-up, participants who received any type of telephone intervention had a decrease in the mean group score on the drug use composite of the ASI, whereas those in the control group had, on average, an increase in composite ASI scores for drug use. There were no significant differences among the four telephone intervention groups. Karno et al. (2012), using the same data as Farabee et al. (2012), also found that, at the 3-month follow-up, the directive

versions of the telephone calls were less effective with clients who were assessed as being high in "reactance" at baseline before the interventions, whereas the directive approaches were more effective for those clients assessed as low in reactance. The nondirective styles of telephone interventions did increase the likelihood of abstinence at 3 months in the high reactance group of clients (although the difference did not reach statistical significance).

Ongoing monitoring can also be conducted using email, but research is lacking regarding this approach. Collins, McAllister, and Ford (2007) discussed their own experiences and client responses to regular email communication for continuing care as well as for outpatient treatment. They noted that, although they have found this approach to be beneficial and well-received, a lack of reimbursement for the service and privacy issues are concerns that need to be addressed. New Web-based technologies are already replacing phone and email monitoring, and some trial projects reported on their use for recovery monitoring (Cucciare et al., 2009). For example, in VA's My Recovery Plan, clients receiving VA substance use disorder treatment services can monitor progress toward recovery goals and receive feedback and reminders relating to medication compliance, behavioral health appointments, mutual-help meetings, specific tasks relating to their goals, and relapse triggers and the use of coping skills (Cucciare et al., 2009; Weingardt & Lysell, 2007). Site users are also able to complete online self-change modules intended to aid them in their recovery (Weingardt & Lysell, 2007).

Internet technology can also be used to collect data regularly about clients' treatment experiences, satisfaction with and participation in treatment and mutual help, and ongoing substance use; these data can then be displayed in a convenient format to monitor client progress. Cucciare et al. (2009) described a few programs (including their own developed for VA) that enable such monitoring for outpatient clients. As with mental illness (see the "Peer Support/Mutual-Help Groups" section), online mutual-help groups may also be of help to clients in recovery from substance use disorders. Research shows that mutual help improves long-term recovery from substance use disorders (see the planned TIP, *Relapse Prevention and Recovery Promotion in Behavioral Health Services* [SAMHSA, planned b]), but little has been done to evaluate the effects of online recovery services specifically. Hall and Tidwell (2003) conducted a descriptive survey of users of Web-based mutual-help and peer services and found that users were twice as likely to be female as male, were predominantly White Americans, and had a mean age of 46.

Administrative Issues in the Use of New Technologies

Overview

Computer and phone technologies offer many opportunities for behavioral health services, enabling them to potentially improve cost-effectiveness while also reaching individuals who might not otherwise receive such services. However, some authors have observed that the behavioral health system is not prepared for what are likely to be large-scale increases in the use of Web-delivered care in coming years (Alleman, 2002). Cartreine, Ahern, and Locke (2010) discussed some of the systemic and programmatic changes needed to meet the need for more computer-based treatment, as well as addressing related business and legal issues. Kraus and Zack (2004) explored some of the business-related aspects of setting up and conducting online therapy. The sections that follow touch on legal and ethical issues, questions of reimbursement, and potential problems with implementing new interventions using these technologies, as well as

the use of such technologies to provide supervision and training. However, this section does not provide a detailed discussion of those topics; the reader should consult Part 2 of this TIP for more information, as well as for information on other topics of interest to program administrators.

Legal and Ethical Issues

There is little if any research on legal and ethical issues in this context, but a number of authors have published opinions on this topic (Baker & Bufka, 2011; Barnett & Scheetz, 2003; Cartreine et al., 2010; Kanani & Regehr, 2003; Kraus, 2004; Mallen, Vogel, & Rochlen, 2005; Midkiff & Wyatt, 2008; Ragusea, 2012; Recupero, 2006; Shaw & Shaw, 2006; Welfel & Heinlen, 2010). Many have also explored self-disclosure and confidentiality in Web-based behavioral health interactions, including Joinson and Paine (2007); Ragusea (2012); and Zur, Williams, Lehavot, and Knapp (2009). The specifics of their recommendations are beyond the scope of this literature review, but readers are referred to Part 2 of this TIP, which discusses these issues at length.

McAdams and Wyatt (2010) explored issues relating to the regulation of both therapy and clinical supervision conducted using telecommunication technologies, and they reported on information gleaned from interviews with licensure board members. Many of the legal issues that might affect Web-delivered or similar interventions have yet to be determined—for example, the degree to which the developer of a computer-based intervention can be held accountable for malpractice (see Cartreine et al., 2010, for a discussion of this and similar issues). One area of particular legal and ethical concern is the safety of clients being treated remotely using phone and Web technologies. Luxton, O'Brien, McCann, and Mishkind (2012) reviewed literature regarding, and discussed issues related to, client safety for people treated via video conferencing while in clinically unsupervised settings.

State regulations concerning the use of Internet and phone technologies for providing counseling and supervision/training are changing quickly, and providers should seek appropriate guidance for their state regulations and any appropriate regulations concerning the provision of services across state lines. In 2008, McAdams and Wyatt (2010) surveyed state boards responsible for counselor certification and found that only 14 states had regulations concerning TAC; only 6 had regulations regarding technology-assisted supervision. Another 20 states had regulations that were either under discussion or in development. In some cases, it may be possible to obtain state waivers so that therapy conducted over the Internet or videophone will qualify as an in-person service, as was the case for clients who were Deaf in the Wright State University e-therapy substance use disorder treatment program (Moore et al., 2009). Laws are rapidly changing in this area, and readers should seek legal advice from professionals regarding state laws and regulations, risk and liability, and insurance coverage, especially in regard to risk management issues associated with TAC.

Implementing New Technologies

Technical Assistance Publication 31, *Implementing Change in Substance Abuse Treatment Programs* (CSAT, 2009b), provides more detailed information about the process of implementing new programs and interventions in substance use disorder treatment settings, much of it applicable to other behavioral health settings. This section addresses some additional

literature that discusses implementation of specific types of interventions and the potential challenges involved.

The process of implementation should begin with a weighing of the pros and cons of integrating these technologies into a program. Pros include increasing cost-effectiveness, extending the reach of services, and facilitating information exchange with some clients; cons include higher dropout rates compared with services delivered in person, the possibility that certain interpersonal factors that can positively affect treatment may be removed from services, and the possibility that such services may eventually reduce the need (and payment) for in-person services (Cucciare, 2010).

Lovejoy, Demireva, Grayson, and McNamara (2009), in an article exploring the implementation of online therapies in light of Rogers' diffusion of innovations theory, identified a number of potential barriers to such implementation and some of the ways in which adaption of this technology might be accelerated. Jones, Leonard, and Birmingham (2006) also reviewed some of the barriers involved in setting up an online program for mental health services. They discussed necessary hardware, treatment protocols, and some of the technical issues that need to be addressed (e.g., camera positioning). However, such issues need to be evaluated in light of technology advancements, which are rapidly occurring. Brooks, Ryder, Carise, and Kirby (2010) observed that computerized interventions may be especially vulnerable to partial implementation, because counselors/therapists may not understand how to integrate those services into existing practice and/or have reservations about clients' abilities to make use of such interventions. Program managers may also want to consider applying an implementation framework, such as Promoting Action on Research Implementation in Health Services or Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation. Both of these were discussed by Cucciare (2010) in the context of implementing new technology in behavioral health settings.

Reimbursement for Services

In the past, problems getting reimbursement for services or having access to services from a given payer kept many programs from using phone- and/or Web-delivered interventions. A 2005 survey of 62 organizations providing telehealth services (not necessarily behavioral health service providers) found that 58 percent were receiving reimbursement from private payers, and 81 percent (apparently of those that billed private payers) stated that there was no difference in the amount of reimbursement between telehealth and traditional services (Whitten & Buis, 2007). Around the same time, other data indicated that many health plans only used Internet services for limited purposes. In a survey of 368 health plans across the country, two-thirds reported that they provided online behavioral health self-assessment tools; about half offered online referrals; but only 2 percent provided online counseling (Horgan, Merrick, Reif, & Stewart, 2007).

Behavioral health programs offering services online are increasing, but many still do not do so. Hall and Hall (2009), based on a review of both policies and initiatives, identified potential problems with the current funding situations for Web- and phone-based services, including:

- Not having single state sources of information on funding and conducting such services.
- Complex and sometimes confusing rules concerning such services.

- Changes in policies and laws that may not affect changes in service delivery and the funding of such services.
- A limited impetus to change the current status quo in regard to such services.

However, recent changes may make it easier for programs to receive reimbursement for behavioral health services provided via the Internet. As of 2012, 15 states had passed legislation requiring that private payers reimburse for telehealth services under certain circumstances (Billings, 2012). Under certain circumstances and for approved providers, Medicare will approve reimbursement for some telehealth services, including behavioral health services. However, the Medicare regulations are complex and are being amended regularly, especially in terms of the use of technologies and in light of the changes related to the expansion of healthcare coverage under the Affordable Care Act.

Hall and Hall (2009) noted the difficulty of sorting out the complexities involved with Medicare and Medicaid reimbursement. The American Psychological Association (APA) and other behavioral health organizations track changes and initiatives of interest to their membership (APA Practice Organization, 2011). States decide whether or not Medicaid will allow for reimbursement of telehealth services, which services will be covered, and under what conditions. As of 2012, 40 states provided Medicaid reimbursement for at least some electronically delivered behavioral health services (Secure Telehealth, 2012). The ATA (2010) provided more detailed state-by-state information about telehealth services that are reimbursable under Medicaid as well as other state laws and policies relating to telehealth services, but as these policies are still changing, it is important to consult state entities to determine current policies. See Part 2, Chapter 1 of this TIP for more on reimbursement issues.

Supervision and Training Using New Technologies

Many counselor training and education activities are already conducted using computers and the Internet, and research generally indicates that these technologies are effective for this purpose (Ferreira, 2005; Liebowitz, 2003; Murdock, Williams, Becker, Bruce, & Young, 2012). Computer technologies also offer a number of potential benefits for the training of counselors, such as the ability to provide real-time feedback to trainees who are conducting practice sessions (Rosenberg, 2006). Trepal, Haberstroh, Duffey, and Evans (2007) discussed some of the issues involved in teaching counseling skills via the Internet, especially in terms of establishing a relationship. A review by Hayes (2008) discussed the use of computers in training and supervising counselors, including such factors as use of computer-based simulations, student attitudes toward new technology, and ethical issues. Individual and group instruction can be conducted using Web-based technology; at least one study has found the latter to be an effective training platform for teaching CBT to counselors (Weingardt, Cucciare, Bellotti, & Lai, 2009).

Different types of technology may have different specific applications to training and supervision, just as they do to counseling. Video conferencing and text-based interactions, such as using instant messaging or online chat forums, can be effective ways to improve counselor attitudes and skills (Abbass et al., 2011). Carlson-Sabelli (2010) discussed the use of Internet forums as an adjunct to counselor training and supervision. Coursol, Lewis, & Seymour (2010) discussed the application of video conferencing technology to counselor training and supervision. However, not all studies have found Web-based training as effective as that

delivered in person. For example, Sholomskas et al. (2005) found the effectiveness of a training Web site with written materials superior to written materials alone, but somewhat less effective than an in-person seminar with supervised casework for the teaching of CBT. The Internet can also be used to train auxiliary staff members and peer assistants. Worrall and Fruzzetti (2009) discussed the use of a Web-based training program using online videos for peer supervisors working with therapists delivering dialectical behavior therapy. Vaccaro and Lambie (2007) reviewed options for conducting computer-based training and supervision, as well as advantages and disadvantages and ethical concerns for this type of supervision/training.

Smith, Carpenter, et al. (2012) randomly assigned 97 substance use disorder treatment counselors who were enrolled in a 2-day motivational interviewing workshop to receive live supervision conducted using video conferencing technology, supervision using videotaped practice sessions, or the workshop alone without an additional supervision component. Participants' sessions with clients were rated 1, 8, and 20 weeks after the workshop using the Motivation Interviewing Treatment Integrity Coding System. Participants who used teleconferencing for supervision had significantly better compliance compared with those who used the workshop alone, and they did a significantly better job in maintaining a proper ratio between questions and reflections than did those in either of the other groups.

Clinical supervision can also be conducted using phone and Internet technologies. Abbass et al. (2011) reviewed literature on the use of Web conferencing technology to supervise psychotherapists. They noted its benefits in terms of reducing costs, enabling long-distance supervision, and integrating supervision with training and educational materials. They also reviewed some potential problems, such as technical difficulties, the absence of local support during times of crisis, and possible difficulties/anxieties relating to the supervisory alliance. Wood, Miller, and Hargrove (2005) provided a model for a four-part training process for counselors and supervisors and discussed the use of telephone and computer technology to provide clinical supervision to counselors working in rural areas.

Peer supervision and support can also be provided to counselors via Internet or phone. Yeh et al. (2008) suggested that an online peer supervision group is a viable alternative to in-person groups, and they found that participants in an online peer supervision group for counselors felt comfortable and confident using this form of interaction. A related issue is the need to train therapists in the use of electronic media to conduct therapy. As Abbott et al. (2008) observed, training is needed to communicate effectively via computer, with attention to tasks such as communicating empathy via text instead of in person and handling ethical issues that might arise in the e-therapy situations.

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