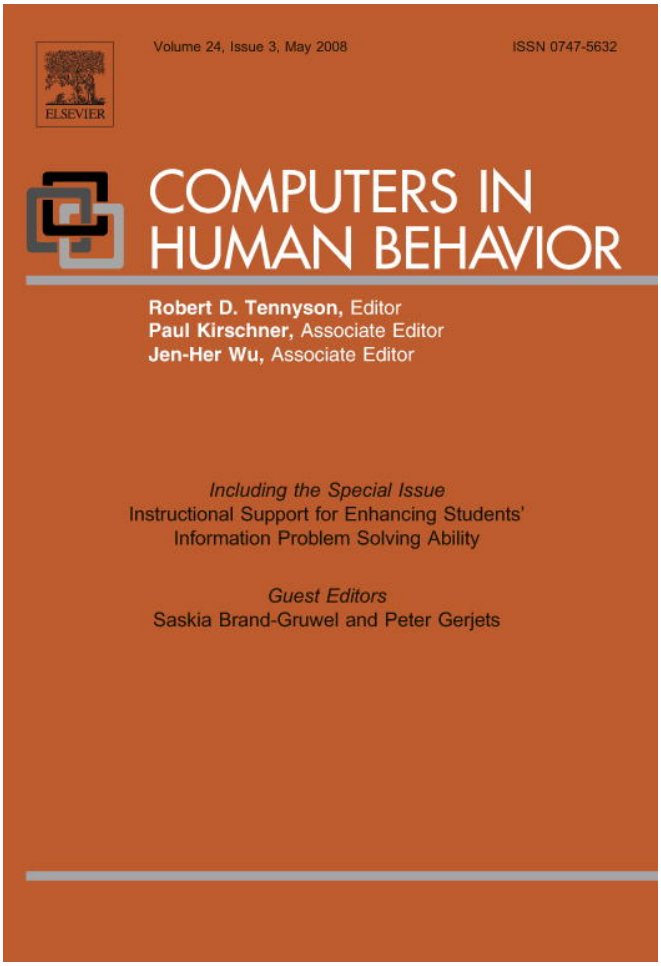

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The use of computers in the assessment and treatment of obsessive–compulsive disorder

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Abstract

This article reviews the empirical literature related to the use of computer-administered, cognitive–behaviorally based assessment and treatment for obsessive–compulsive disorder (OCD). Such research has increased steadily over the years, and has shown that treatments such as BT STEPS are effective at both assessing for and treating OCD. More large-scale studies examining the utility of such programs are needed, but initial research shows moderate to large effect sizes for reduction of OCD symptoms and impairment in functioning. The article concludes with recommendations for future directions for both clinical work and research in this area, including expansion of such services to assist in gaining more knowledge of how effective such treatments are, expand the number of people who could benefit from receiving such services, and examining the use of computers in treatments for other anxiety disorders to suggest new ways to move forward with OCD treatment.

Keywords: Obsessive–compulsive disorder; Treatment; Assessment; Computer

1. Introduction

Obsessive–compulsive disorder (OCD) is a debilitating and chronic mental disorder, with lifetime prevalence rates estimated as high as 2.5% in the United States (Karno & Golding, 1991) and 2% worldwide (Sasson et al., 1997). People with OCD experience

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symptoms such as intrusive, unwanted thoughts and ideas that cause an increased amount of anxiety (i.e., obsessions), and intentional, repetitive behaviors that decrease the anxiety (i.e., compulsions; American Psychiatric Association, 2000). These obsessions and compulsions frequently impair the functioning of both the person with OCD (Piacentini, Bergman, Keller, & McCracken, 2003) and their friends or family (Calvocoressi et al., 1995; Cooper, 1996).

Fortunately, effective treatments for OCD, both psychological and pharmacological, are available to both children (Abramowitz, Whiteside, & Deacon, 2005; Pediatric OCD Treatment Study Team, 2004) and adults (Abramowitz, 1997; Foa et al., 2005). Yet, people with OCD have a very low rate of help-seeking behavior, with one study finding that only 20% have sought help from a trained mental health professional (Leon, Portera, & Weissman, 1995). Several reasons have been proposed for this low rate of treatment seeking, including factors common to all mental disorders such as lack of trained professionals and the prohibitive cost of treatment (Leonard, Swedo, & Lenane, 1993) and reasons specific to those with OCD, such as a lack of obsessions easily recognized as such by others (Mayerovitch et al., 2003) or reluctance to engage in exposures (Leonard et al., 1993).

Given both the reluctance of many people with OCD to seek evidence-based treatment for their difficulties via traditional therapy and an emphasis on self-help for increasing efficacy (Clark, Kirkby, Daniels, & Marks, 1998), computer-based treatments for OCD are a plausible alternative to traditional therapy. Over the past 20 years, the development, use, and research on the effectiveness of computer-based treatment for mental disorders has been steadily growing (Taylor & Luce, 2003). Such treatment programs can greatly reduce the time needed by a clinician to provide treatment (Oakley-Browne & Toole, 1994), are seen by patients as empathetic (Schneider, Schartz, & Fast, 1995), and provide effective treatments with large cost savings over traditional therapy (Newman, Kernady, Herman, & Taylor, 1997). In fact, one study found that 91% of patients seeking help for anxiety disorders wanted access to some type of computerized system to assist in treatment (Graham, Franses, Kenwright, & Marks, 2000). In addition, a recent meta-analytic study of computer-based treatments for depression and generalized anxiety found a significant reduction in depressive and anxious symptoms, with a mean effect size of 1.38 (Cavanagh & Shaprio, 2004). Despite these promising results, the use of computerized treatments based on cognitive–behavioral therapies for most mental disorders is still relatively small, as is the research on their effectiveness (Cavanagh, Zack, & Shapiro, 2003). This article reviews the empirical literature related to the use of computer-administered, cognitive–behaviorally based assessment and treatment for OCD.

2. Computerized treatments for anxiety disorders

The anxiety disorder spectrum has been among the most well researched area in the realm of computer-based and computer-supported therapies (Marks et al., 2003; Proudfoot et al., 2003). Currently lacking, however, is a synthesis of the literature that can help to guide future clinical endeavors in specific areas of treatment. Following in the footsteps of well-established and effective cognitive and behavioral treatments (CBT) for anxiety disorders (Brown, O'Leary, & Barlow, 2001), these programs adapted face-to-face therapeutic techniques to computer-based or computer-guided treatments (Cavanagh & Shaprio, 2004). CBT lends itself particularly well to computer-based treatments, as it tends to be highly structured and focused on specific behaviors (Anderson, Jacobs, & Rothbaum,

2004). Treatments have been designed for a large number of anxiety-related disorders, including specific phobias (Gilroy, Kirkby, Daniels, Menzies, & Montgomery, 2000; Muhlberger et al., 2001; Rothbaum et al., 1995), generalized anxiety disorder (GAD; Newman, Consoli, & Taylor, 1999), social phobia (Anderson, Rothbaum, & Hodges, 2003), and panic disorder (Schneider, Mataix-Cols, Marks, & Bachofen, 2005).

Treatments involving computers for the anxiety disorder spectrum can be examined in a number of ways. First, they can be divided into three categories based on the type of technology they use (Anderson et al., 2004). First are those programs that utilize virtual reality (VR) during treatment. This typically includes exposures to feared or worrisome stimuli via head-mounted displays that provide both auditory and visual cues to the stimulus. VR has been found to be particularly effective for treatment of phobias (Pull, 2005), with flying and height phobias being the most extensively studied and supported (e.g., Kahan, Tanzer, Darvin, & Borer, 2000). The second type of technology involves the use of handheld computers. Such computers have been used to assist in the treatment of GAD (Newman, 1999), social phobia (Gruber, Moran, Roth, & Taylor, 2001), and panic disorder (Newman et al., 1997). Handheld computers have been used in a number of ways, such as assessing symptom frequency and duration or assisting in completion of homework. The third method of treatment delivery is through the use of software programs delivered through a personal computer. Perhaps the most often used method, this type of delivery has been used in the treatment of several different anxiety disorders, with strong empirical support (Cavanagh & Shaprio, 2004).

A second, and perhaps more clinically practical, method for examining treatment involving computers is to examine the division of time between use of the computer and face-to-face contact with a therapist. Newman, Erickson, Przeworkski, and Dzus (2003) description of four levels of therapist involvement for self-help therapies (i.e., self-administered, predominately self-administered, minimal-contact, and predominately therapist-administered) translates very well to computer use. First, there are completely self-administered computer-based treatments that do not involve a therapist during the course of therapy (e.g., *FearFighter*; see Kenwright, Marks, Gega, & Mataix-Cols, 2004). Such treatments are best used when clients have limited or no access to a therapist or are reluctant to attend therapy for some reason. The second category, predominately self-administered, encompasses those programs that are primarily self-guided but have a very limited amount of face-to-face contact. This can be done in scheduled, brief contacts with the therapist that correspond with certain points in the treatment (e.g., a preassessment, explanation of treatment, etc.). The minimal-contact category often divides session time between computer use and contact with the therapist, with therapist contact significantly less than in traditional therapies (e.g., Kenwright, Liness, & Marks, 2001). The last category encompasses treatments in which computers provide adjunctive treatment, with direct face-to-face contact with the therapist prominent during the course of therapy. This can include use both in session (e.g., VR for exposures; Rothbaum, Hodges, Ready, Graap, & Alarcon, 2001) and out of session (e.g., tracking of GAD symptoms and homework; Newman et al., 1999).

Despite the fact that the use of computers in the assessment and treatment of OCD has occurred since the mid-1980s (e.g., Baer, Minichiello, & Jenike, 1987), there have been no comprehensive reviews of this literature. Examining the current range of OCD treatments that involve computers can help to identify those areas where the use of computers has been demonstrated as efficacious, as well as those areas where computers may be useful,

based on treatments for other anxiety disorders. Using the four levels of therapist contact described by Newman et al. (2003), in addition to describing the type of technology employed, can assist in easily identifying gaps in assessment and treatment. The method used for selecting studies began with a comprehensive review of all articles indexed in the online database PsycINFO that contained both "obsessive–compulsive disorder" and "computer" in either the title or abstract. Those papers were then reviewed for citations of published papers that were not indexed through PsycINFO.

3. OCD assessments utilizing computers

The first published reports on the use of computers to assess for OCD symptoms began surfacing in the early 1990's (see Table 1). The first to appear was called Kraepelin and used a total of 50 natural language questions and 115 rules of reasoning to either reach a diagnosis of OCD or suggest one of several differential diagnoses (Roca-Bennasar, Garcia-Mas, Llaneras, & Blat, 1991). Based on the lack of future publications using Kraepelin and the authors' noted difficulties with user acceptance of the system (Roca-Bennasar et al., 1991), it does not appear that this system gained widespread use or acceptance in the field. Only a year later, a computerized version of the most widely used measure of OCD symptoms, the Yale-Brown Obsessive–Compulsive Scale (Y-BOCS; Goodman et al., 1989), was detailed in a brief article by Rosenfeld, Dar, Anderson, Kobak, and Greist (1992). The results suggested that the computerized version of the Y-BOCS was as good as the clinician-administered Y-BOCS for measuring symptoms in OCD clients. In a non-OCD sample, however, people were rated as having significantly more OCD symptoms on the computerized version than the clinician-administered version. In addition to its validity in assessing OCD symptoms, the computerized version was rated as having high user-friendliness and ease of use and, unlike the Kraepelin, has been used in several published articles (e.g., Herman & Koran, 1998). Another adaptation of the Y-BOCS came in the form of a computerized system that used a telephone-based interaction and was also tested in the early 1990s (Baer, Brown-Beasley, Sorce, & Henriques, 1993). Using an interactive voice response (IVR)

Table 1
OCD assessments utilizing computers

Author(s)	Year	Tech	Results	Comments
Roca-Bennasar et al.	1991	PC	Good reliability between program and clinician ratings	Never widely used due to lack of user-friendliness
Rosenfeld et al.	1992	PC	High validity in assessing OCD symptoms when compared to clinicians	Computer version of Y-BOCS; used in a number of future studies
Baer et al.	1993	TEL	High computer-clinician validity for OCD symptoms	Telephone accessed version of the Y-BOCS
Marks et al.	1999	TEL	High correspondence between clinician and computer ratings	Used same system as Baer et al. (1993)
Herman & Koran	1998	HH	Moderate correlation between self-recorded symptoms and clinician-rated symptoms	Small sample size, problems with how symptoms were recorded on the computer

Tech: Handheld or portable computers (HH), software packages delivered via personal computer (PC), software packages delivered via telephone (TEL).

system, which is a computerized system that allows a telephone caller to choose from options on a voice menu and interact with the computer phone system via speech, the clients were able to be guided through the Y-BOCS interview by digitized human speech. Similar to the Rosenfeld et al. (1992) study, this approach also showed high agreement between a clinician-administered interview and the computer-administered one.

One of the next major advances in a computer-based assessment for OCD was the development of BT STEPS, which combined assessment and treatment into one comprehensive package (Baer & Greist, 1997). The BT STEPS program has been used in multiple studies and the assessment portion was completed by 84% of persons who started it (Marks et al., 1998). This IVR program had the clients list their rituals, the cost behind performing them, and the triggers for each ritual. They then had to rate these rituals on how impairing and distressing they were throughout the treatment program, as well as complete a Y-BOCS at both pre- and post-treatment. At this same time, Herman and Koran (1998) published a study investigating the use of handheld computers for assessment of OCD symptoms as they occurred in the environment. Due to some methodological difficulties regarding the use of the computers and a small sample size, only moderate agreement was found between clinician-administered Y-BOCS scores and data gathered from the handheld computers ($r = .53$, $p = .08$). Since the late 1990's, the only published studies using computer-based assessment methods have been as part of the BT STEPS program (e.g., Marks et al., 2000).

4. OCD treatments utilizing computers

As of 2006, only eight published studies were found that used a type of computer-based treatment for OCD (Table 2). The earliest published records were by Baer et al. (1987) and Baer et al. (1988), who developed a program that ran on a handheld, portable computer to assist in the treatment of clients with OCD. Called OC-CHECK, it served two purposes: reminding clients of the instructions given during treatment sessions and tracking information about the intensity and frequency of the obsessions and compulsions. Baer et al. (1987, 1988) reported findings from two case studies in which each client experienced a large reduction in symptom occurrence when using the computer, an increase in symptoms when the computer was removed, and a subsequent decrease in symptoms when the computer was reintroduced. It was concluded that the use of the computer was more "a method of control, and not a method of procuring change (Baer et al., 1988)." Although only a brief report on two cases, these publications signaled the beginning of the development of using computers to treat OCD.

Between the publication of the Baer et al. (1988) study and the mid-1990s, little work was published examining the use of computers to treat OCD. The next major step in this area would come from Baer and Greist (who helped develop and test the computer-administered Y-BOCS; Rosenfeld et al., 1992) with a program called BT STEPS (Baer & Greist, 1997). As with the previous assessment for OCD by Baer et al. (1993), BT STEPS is an IVR system, allowing users to access via the telephone a computer that assists in guiding behavioral treatment for OCD. When completing the program, patients move through a series of nine "steps" that involve a behavioral assessment, developing and implementing a treatment plan, and maintaining progress. Baer and Greist's (1997) preliminary report, which primarily focused on the need for such a system, described a reduction in symptoms for BT STEPS comparable to that of selective serotonin reuptake inhibitors (SSRI; Greist,

Table 2
OCD treatments utilizing computers

Author(s)	Year	Type	Tech	Results	Comments
Baer et al.	1987; 1988	AT	HH	Large reduction of Sx when in use, but not when computer removed	Case studies, no statistics reported
Baer & Greist	1997	CSA	TEL	Reduction in Sx comparable to SSRI	Preliminary report; no statistics reported
Greist et al.	1998	CSA	TEL	61% rated themselves as "much improved"; decrease in Y-BOCS scores similar to SSRI; increase in overall functioning	First study to report actual statistics; those patients who did 2+ self-exposures showed greatest reductions in Sx
Bachofen et al.	1999	PSA	TEL	Large reductions in Y-BOCS scores; increases in overall social and work functioning	Added brief patient–therapist contacts, no change in outcomes
Clark et al.	1998	CSA	PC	Decrease in depressive Sx; decrease in obsessions and compulsions	Recommended as an introduction to or adjunctive treatment
Marks et al.	2000	CSA	TEL	Decrease in Y-BOCS; increase in functioning	BT STEPS showed greater Sx reduction than therapist-guided
Greist et al.	2002	CSA	TEL	Decrease in Y-BOCS; increase in functioning; changes comparable to SSRI	Largest and most well-designed study yet; no difference between computer and therapist groups who did 2+ exposures

Type: completely self-administered (CSA), partially self-administered (PSA), adjunctive treatment (AT).
Tech: Handheld or portable computers (HH), software packages delivered via personal computer (PC), software packages delivered via telephone (TEL).
Results: Symptoms (Sx), Selective Serotonin Reputake Inhibitors (SSRI), Yale-Brown Obsessive–Compulsive Scale (Y-BOCS).

Jenike, & Robinson, 1995), a commonly prescribed medication for OCD, although they reported no statistical data.

The following year saw several articles published that utilized computers for OCD treatment. First, Greist et al. (1998) reported on self-treatment for OCD using the IVR system described above (Baer & Greist, 1997). Following a one-week baseline period, participants performed first a self-assessment and then self-treatment over the course of 12 weeks. This was followed by a 22-week "open period" in which participants could still access the system any time they desired. A total of 40 participants took place in this pilot study, of which only 20 completed both the assessment and treatment phases. At the end of the 22-week "open period," 61% of all participants rated themselves as either "much improved" or "very much improved." Importantly, those participants who had actually engaged in two or more self-exposures were significantly improved on the Y-BOCS, with those who had engaged in greater than 20 exposures having over 50% less symptoms (Y-BOCS mean = 25.6 vs. 12.1, $p < .001$). Again, such an improvement in symptoms was comparable to clinical trials involving SSRIs prescribed for OCD (Greist et al., 1995). Also of note was a significant reduction on the Work and Social Adjustment Scale (WSA; Marks, 1986), which measures functioning at work, home, social situations, and private leisure time (WSA mean = 11.2 vs. 8.6, $p < .008$).

A follow-up study published by Bachofen et al. (1999) modified the feedback participants received by including either brief telephone contacts or written notes in addition to faxed sheets. In addition, these participants were all on a waitlist for receiving therapist-guided behavior therapy for OCD. A similar pattern of results was found when compared to the Greist et al. (1998) study. That is, those participants who completed two or more self-exposures, regardless of overall use of the system, showed highly significant decreases on total Y-BOCS scores (mean = 25 vs. 15.2, $p < .001$ and WSA scores (21.9 vs. 14.6, $p < .001$)). The inclusion of more contact with a therapist did not appear to impact the amount of participants who engaged in self-exposure, however, as less than 50% of subjects did two or more exposures. As all the participants in the study first used BT STEPS and then proceeded to receive therapist-guided treatment for OCD, comparisons were also made between gains made while using BT STEPS and treatment gains made during subsequent clinician-guided behavior therapy. Those participants who had completed two or more self-exposures during BT STEPS saw only small, non-statistically significant decreases in Y-BOCS scores while completing clinician-guided therapy, while those who had not done self-exposures during BT STEPS improved under clinician care, although the sample size was too small to run inferential analyses. Nakagawa et al. (2000) matched the participants in this study to the historical records of participants in therapist-guided ERP to compare social and work functioning. Both groups showed significant post-treatment improvement on the WSA and, surprisingly, showed it to a similar degree (mean decreases of 5 points for BT STEPS and 7 points for therapist-guided, $p = .18$).

A smaller study examined the use of computer-aided exposure as an adjunct to behavioral therapy for OCD (Clark, Kirkby, Daniels, & Marks, 1998). Thirteen participants with OCD and 10 without were all given baseline measures of obsessive and compulsive symptoms, including the Y-BOCS, Padua Inventory (PI; Sanavio, 1988), and Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbauch, 1961). For all total scores, those patients with OCD had significantly higher scores than non-OCD participants. All participants then attended three sessions of treatment in which they guided a person pictured on the computer screen in doing exposures to dirt without washing their

hands. Results indicated that participants with OCD displayed significant decreases in both overall levels of depression as measured by the BDI (mean decrease = 6.3, $p = .05$) and obsessions and compulsions as measured by the PI (mean decrease = 14, $p = .01$). These changes in scores are equivalent to effect sizes of 0.60 and 0.81 for depression and OCD symptoms, respectively. Overall, those participants identified as "washers" rather than "checkers" appeared to show more OCD symptom improvement (mean decrease of 16.4 vs. 11.0 on the PI), while checkers showed more depressive symptom improvement (mean decrease of 9.0 vs. 4.0 on the BDI). The authors concluded that this program, although not appropriate for stand-alone treatment, might be useful as an introduction to behavior therapy (Clark et al., 1998). Such a treatment could also be used to provide some symptom relief to those patients waiting to begin therapy.

Marks et al. (2000) published the first study combining computerized treatment with brain imaging. In a small, randomized trail, the researchers placed 13 participants with OCD in either an exposure-therapy group or relaxation training control group. Those participants in the BT STEPS group again showed significant decreases in Y-BOCS scores (mean decrease = 9.1, $p < .001$) and WSA scores (mean decrease = 9.0, $p = .03$). Interestingly, in this study BT STEPS produced larger amounts of change than therapist-guided exposure in OCD symptoms (mean decrease = 2.7, $p = .057$) and adjustment (mean decrease = 2.0, ns).

In the largest study examining computer-administered treatment for OCD to date, Greist, Marks, Baer, et al. (2002) compared behavior therapy delivered via a computer (the BT STEPS program) to therapist-guided exposure therapy to a relaxation control group. From an original treatment group of 218, a total of 176 participants (55 BT STEPS, 55 clinician-guided, 66 relaxation control) took part in at least partial treatment. Both the BT STEPS and clinician-guided therapies showed significant change on Y-BOCS scores compared to the control, relaxation group ($F(2,174) = 12.45$, $p < .001$). Those participants in clinician-guided therapy improved more than those in BT STEPS (mean decrease of 8.0 vs. 5.6, $p = .035$). Effect sizes were also reported, with clinician-guided therapies showing the largest (1.22), followed by BT STEPS (0.84), and control (0.35). Other analyses showed no differences between BT STEPS and clinician-guided therapy on decrease in number of hours spent on rituals and compulsions (3.4 for both, $p = .99$) or WSA score (5.0 vs. 6.8, $p = .247$). Large effect sizes were seen for both BT STEPS (0.71) and clinician-guided therapy (0.82), but not for the relaxation group (0.26) on work and social life adjustment. Of major interest are analyses comparing "compliant" participants in the BT STEPS group (those who completed two or more self-exposures) with therapist-guided treatment, which found no difference between the two groups on decrease in post-treatment Y-BOCS scores (9.3 for BT STEPS vs. 8.1 for clinician-guided, $p = .421$). The authors reported that the magnitude of effect sizes for both BT STEPS and clinician-guided therapies were similar to effect sizes reported for SSRIs approved for the treatment of OCD by the US Food year Administration (Kobak, Greist, Jefferson, Katzelnick, & Henk, 1998).

5. Discussion

With a population estimate of 297.5 million (U.S. Census Bureau, 2005), and using a population estimate of 2.5% for OCD (Karno & Golding, 1991), an estimated 7.5 million people in the United States currently have OCD. Given the relative unfamiliarity of many primary health care providers with OCD (Storch, 2005), telephone and Internet screening

for symptoms and impairments related to OCD would be an excellent use of this technology. Such screenings have been used for depression (Houston et al., 2001) and similar OCD screening methods could be adapted and implemented. As can be seen in the studies reviewed above, the research on the use of computers for both the assessment and treatment of OCD is small in terms of published literature but very promising in terms of outcome. The decrease in symptoms and improvement in functioning across the treatment with the most potential, BT STEPS, is far superior to no treatment, and in some cases was found to be as effective as clinician-guided treatment. The use of computers for OCD assessment is similarly hopeful, both as a stand-alone application (e.g., the computer-administered Y-BOCS) and as part of a comprehensive assessment and treatment package (e.g., BT STEPS). Patients who physicians, nurses, or other healthcare workers feel may be experiencing symptoms of OCD could be directed to a telephone number or website where the patient could take a self-test and, based on the results, be given information related to treatment options for OCD. Providing such technology directly during doctor visits and then giving feedback to the patient could be useful in enhancing motivation to follow-up on such recommendations. In addition, such technology could help tremendously in detecting those with clinically relevant symptoms who have yet to be identified.

While a small number of well-designed research studies have shown the relative ease of use and the clinical effectiveness of such systems, more work still needs to occur. This could include making the system available in more locations across the US and UK (as well as other countries), with training to allow the therapists at these extended sites to operate programs such as BT STEPS. This would not only provide greater availability and reduced cost of treatment to those with OCD, but also has the potential to expand the number of patients seen by any individual therapist without a corresponding increase in contact time (Gega, Marks, & Mataix-Cols, 2004). Increasing the number of sites using these programs would also encourage independent research on the use and effectiveness of computer-based treatments for OCD. With only one large-scale study having been conducted on the effectiveness of BT STEPS (Greist et al., 2002) and no large studies examining the Clark et al. (1998) program, increasing the number of sites would allow increased access to research populations and research collaborators. In addition, studies that combine the use of programs such as Clark et al.'s (1998) or BT STEPS with concurrent therapist-guided exposures would be useful to examine the additive impact of such "therapy stacking" on symptom improvement. Finally, no studies have been conducted that used computerized therapy or assessments for children or adolescents with OCD. Expanding the number of sites where such treatment is available would help to encourage developmentally appropriate adaptations for older children and adolescents who would otherwise not have access to a therapist trained in OCD treatment.

Another expansion of such systems would be translating the preexisting programs into applications that can be delivered over the Internet. One recent study found that 40% of their sample, when given free Internet access, used it to access healthcare information over the course of one year (Baker, Wagner, Singer, & Bundorf, 2003), while the website for the National Institutes of Mental Health registers over seven million hits per month (Taylor & Luce, 2003). Other estimates for use of the Internet as a means to gather health information in general range from 50% to 80% (Fox, Rainie, & Horrigan, 2000; Taylor, 2002). Creating websites that provide research-supported information, screening, and contact information could assist in helping both patients and referral sources (e.g., physicians,

mental health professionals, school personnel) in learning where and how to obtain computer-administered assessments and treatments for OCD. Connecting such websites directly with the websites of those able to deliver such services would expedite the referral process and perhaps increase the likelihood of following-up information seeking with seeking and obtaining treatment.

Examining those computer-based treatments developed for other anxiety disorders can also yield future directions for OCD treatment. For instance, no treatments for OCD have been developed that utilize virtual reality (VR). VR treatments have been found to be effective for a number of different phobias (Pull, 2005), and their adaptation for use as a way to introduce patients to exposure and response prevention seems a natural avenue for research. The use of small, handheld computers began the research on computer-assisted OCD treatment, but little had been done with this modality since the late 1980's. Research examining the use of handheld computers as an adjunctive treatment for general anxiety disorder has shown their effectiveness (Newman et al., 1999), and developing new software to aid in the treatment of OCD is warranted.

In conclusion, research on the use of computer-administered assessment and treatment for OCD has increased steadily over the years. This growing body of research has shown that treatments such as BT STEPS are effective at both assessing for and treating OCD. More large-scale studies examining the utility of such programs are needed, but initial research shows moderate to large effect sizes for reduction of OCD symptoms and impairment in functioning. Further expansion of such services will assist in gaining more knowledge of how effective such treatments are, as well as expand the number of people who could benefit from receiving such services. Examining the use of computers in treatments for other anxiety disorders can also suggest new ways to move forward with OCD treatment.

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