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A Comprehensive Review and a Meta-Analysis of the Effectiveness of Internet-Based Psychotherapeutic Interventions

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ABSTRACT. Internet-based psychotherapeutic interventions have been used for more than a decade, but no comprehensive review and no extensive meta-analysis of their effectiveness have been conducted. We have collected all of the empirical articles published up to March 2006 ($n = 64$) that examine the effectiveness of online therapy of different forms and performed a meta-analysis of all the studies reported in them ($n = 92$). These studies involved a total of 9,764 clients who were treated through various Internet-based psychological interventions for a variety of problems, whose effectiveness was assessed by different types of measures. The overall mean weighted effect size was found to be 0.53 (medium effect), which is quite similar to the average effect size of traditional, face-to-face therapy. Next, we examined interacting effects of various

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possible relevant moderators of the effects of online therapy, including type of therapy (self-help web-based therapy versus online communication-based etherapy), type of outcome measure, time of measurement of outcome (post-therapy or follow-up), type of problem treated, therapeutic approach, and communication modality, among others. A comparison between face-to-face and Internet intervention as reported on in 14 of the studies revealed no differences in effectiveness. The findings of this meta-analysis, and review of additional Internet therapy studies not included in the meta-analysis, provide strong support for the adoption of online psychological interventions as a legitimate therapeutic activity and suggest several insights in regard to its application. Limitations of the findings and recommendations concerning Internet-based therapy and future research are discussed.

KEYWORDS. Internet, Internet intervention, meta-analysis, online therapy, psychotherapy

The Internet has been used for psychotherapeutic interventions for more than a decade. Various terms have been used to denote this special professional activity: etherapy (or counseling), online therapy, Internet therapy, and cybertherapy, and sometimes it is referred to as e-health or telehealth, as a part of more general activities. Although attempts have been made to associate specific terms with more focused activities (e.g., cybertherapy for the use of virtual reality software), this terminology has failed in practice, and professionals and laypersons alike normally use different terms interchangeably. There are, however, several major factors that differentiate among the different therapeutic applications conducted by means of the Internet. One of these has to do with the online-intervention method employed—whether it includes human communication (termed here etherapy) or is a self-help, website-based therapy (termed here web-based therapy). A different major factor has to do with another Internet-enabled capacity—whether an intervention is delivered in “real-time” (synchronously) or is delayed (asynchronously). A third important factor has to do with mode of communication—whether conducted textually, by audio only, or by video (webcam). Other important differentiations have to do with individual versus group mode and therapeutic approach, terms normally associated with traditional, face-to-face therapies.

From its start, Internet therapy has been criticized and opposed by both many laypeople (e.g., Skinner & Latchford, 2006) and professionals (e.g., Lester, 2006; Wells, Mitchell, Finkelhor, & Becker-Blease, 2007) on several grounds. First, the lack of face-to-face visibility—which prevents the transmission and detection of a client's nonverbal communication cues, on the one hand, and the use of a therapist's body language, on the other—created massive resistance. This opposition based on the lack of nonverbal communication was considered an essential component of therapeutic relationships. Second, ethical issues—relating to secrecy and confidentiality, identity of patients and therapists, impersonations, handling of emergency situations, and more—became a central problem with the application of computer-mediated, distance therapy. Third, contemporary laws and regulations did not always cover various situations created by online therapy, such as local licensing requirements, legal jurisdiction, professional insurance of negligence, and more, resulting in often unresolved legal issues. Fourth, practical and technical concerns led to arguments related to the training of online therapists, the dependency on electricity and on complicated, fragile technologies, as well as to worries about the digital divide, and more. All of these criticisms, though they still exist, have been answered to a great degree as the field developed, numerous professionals have connected, literally and figuratively, to this new channel of therapy, advanced technologies emerged, ethical codes were developed, training courses and workshops began to be offered, and so on (Chester & Glass, 2006; Grohol, 2004). Not least, many clients seemed to like this innovative therapeutic option (King et al., 2006).

In the attempt to respond to the questions and critiques posed by the opponents of online therapy, quite a few therapeutic *process studies* were conducted that generally tried to examine the special characteristics of the therapeutic dynamics created in distant, invisible, interpersonal circumstances. The findings of those investigations—obviously concentrating in etherapy of different forms—often showed that therapy processes online are, in many ways, similar to the traditional form of therapy, though they possess some unique features as well, which were identified. Cook and Doyle (2002), for example, found that clients of e-mail- or chat-based therapy rated therapeutic working alliance similar and even superior to that of face-to-face therapy. In an analogue study, Mallen, Day, and Green (2003), however, found higher ratings of disclosure,

closeness, and satisfaction with the face-to-face therapy experience than with that online, though no difference in emotional understanding was detected between the two interaction modes. Escoffery, McCormick, and Bateman (2004) reported on the process development of goal-setting, consciousness growing, and satisfaction of clients using web-based therapy for smoking cessation. Lewis, Coursol, and Herting (2004) studied client and counselor experiences in videoconferencing-based counseling in a qualitative analysis of a case study. They were able to qualify interesting themes in counselor's and client's experiences, and noted the client's positive feelings. In an analogue study, Rochlen, Land, and Wong (2004) found that men with high emotionality preferred online counseling over face-to-face counseling more than did men with low or restricted emotionality. Bickmore, Gruber, and Picard (2005) showed that bond and working alliance may be achieved even when working with an automated software agent. In an observational analogue study, Rees and Stone (2005) saw that clinicians rated working alliance in videoconferencing-based therapy lower than in traditional, face-to-face sessions. Young (2005) investigated the attitudes of clients treated through online chat groups; although convenience and anonymity were cited as favorable factors, privacy and security concerns were listed against its use. Barak and Bloch (2006) found that session-impact factors in chat-based therapy were related to the perceived helpfulness of sessions. Leibert, Archer, Munson, and York (2006) studied clients' working alliance in, and satisfaction with, e-mail- and chat-based counseling; both were rated inferior to face-to-face experiences. Reynolds, Stiles, and Grohol (2006) found session-impact factors and therapeutic alliance in e-mail-based therapy to be similar to face-to-face therapy for both therapists and clients. According to Ritterband et al. (2006), the use of audio, graphics, and interactivity in website-based treatment of encopresis with children contributed to their elevated knowledge, motivation, and readiness to change. Thus, generally speaking, these studies show that counseling and psychotherapy relationships can effectively take place under the special circumstances enabled by the Internet as far as major therapeutic processes are concerned.

The main questions consistently asked throughout these studies and through numerous other publications have been whether therapy practiced online was effective, whether therapy could be conducted effectively (i.e., achieve its therapeutic goals) through the Internet, whether it was as effective as traditional therapy, and how various

methods and variables associated with online therapy affected its effectiveness. Although quite a few individual studies on treating a variety of psychological problems have been conducted to date and numerous case studies have been published and presented, a comprehensive review and examination of these questions are still lacking.

Several attempts were made to provide an inclusive review on the effectiveness of online psychological interventions. These attempts, however, offered a rather limited view of the question at hand, mainly because of their partial inclusion of the published research (e.g., Anthony, 2006; Ritterband et al., 2003; Tate & Zabinski, 2004; Ybarra, Eaton, & Bickman, 2005); stenographic, encyclopedic-style summary (Barak, 2004); emphasis on history and development rather than effectiveness (e.g., Skinner & Zack, 2004); concentration on a specific problem area, such as anxiety (Andersson, Bergström, Carlbring, & Lindefors, 2005), depression (Andersson, 2006), panic disorder (Carlbring & Andersson, 2006), smoking cessation (Etter, 2006; Walters, Wright, & Shegog, 2006), weight loss (Weinstein, 2006), health-related problems (Strecher, 2007), or problem drinking (Walters, Miller, & Chiauuzzi, 2005); concentration on web-based interventions only (Andersson, 2006; Griffiths & Christensen, 2006; Pull, 2006); focus on video-based therapy (Simpson, 2003); or their mixing together therapy and support (Mallen, Vogel, Rochlen, & Day, 2005). Although the general conclusion of these reviews, as well as several others, was highly supportive of Internet therapy, it seems that reliance on these resources is insufficient because their surveys of the literature are in effect incomplete or narrow. In addition, none of these reviews made an attempt to examine interactions of relevant moderators (e.g., age of clients, therapeutic approach) with therapy outcome. It should be noted that several books focusing on etherapy and e-counseling (e.g., Derrig-Palumbo & Zeine, 2005; Hsiung, 2002; Kraus, Zack, & Stricker, 2004; Tyler & Sabella, 2003) also provided a general and partial review of research, as well as numerous case examples, but did not provide a thorough and comprehensive view of the area.

Three meta-analytic reviews that are relevant in part to our current research questions were conducted. Wantland, Portillo, Holzemer, Slaughter, and McGhee (2004) conducted a meta-analysis of 22 web-based versus non-web-based psychological interventions intended to educate and create behavioral change in people with chronic illness. They found a large variability in effect size (*ES*), ranging from -0.01 to $+0.75$, which averaged out to a moderate mean *ES*.

In another meta-analytic review, Spek et al. (2007) examined 12 studies that tested the effectiveness of web-based cognitive-behavioral therapy (CBT) for depression and anxiety. They found a small-to-moderate *ES* for the treatment of depression and a large *ES* for the treatment of anxiety. Provision of therapist support (provided online) moderated these findings, as therapist support resulted in large effects and no such support resulted in small effects. These two meta-analyses referred only to web-based interventions in specific problem areas. Hirai and Clum (2006b) conducted a meta-analysis of the effectiveness of various self-help venues in helping people with anxiety problems, including computer and Internet self-help interventions among other methods (e.g., printed materials, videotapes). They found that computer- and Internet-based self-help interventions appeared, for the most part, to yield equally effective treatment outcomes as the other self-help interventions.

The aim of the current meta-analytic study was to provide fuller, more comprehensive answers to questions relating to the effectiveness of online psychological interventions. Our research was meant to cover a broad data set that referred to a variety of online technological methods, intervention settings, psychological approaches, problem areas, and other features that exist in the provision of psychotherapy through the Internet. The purpose was to examine the effectiveness of online interventions in general, and specifically in quantitative empirical studies and in the impact of moderators that interact with therapy outcome.

METHOD

Data Collection

We searched and collected all published studies relevant to our meta-analysis. The studies we used met these criteria: (1) they were published in a refereed journal in English at any time until March 2006 (inclusive); (2) they empirically studied the effectiveness of psychological treatments conducted through online channel(s) of communication (that is, Internet-delivered therapy); (3) the intervention was based on the actual implementation of a psychological intervention (rather than just the provision of online support or an online assessment); (4) the study contained more than five participants

receiving online treatment; (5) treatment effectiveness was based on at least pre-post quantitative comparisons; (6) effectiveness of treatment was based on at least one actual outcome measure.

The search for studies was conducted by using the PsycINFO and MEDLINE databases as well as the Google Scholar and Scopus online scientific search engines. In addition, we checked the bibliographies of numerous articles to detect possible missing items. Except for a single article, all of the studies included in our research had been published up to and in March 2006; in the single exception, the study was made public by being posted on a publisher's website (it came out in print shortly thereafter).

In total, we collected 69 articles that met the inclusion criteria. Additional 47 articles that examined the effectiveness of online therapy were rejected because they had either insufficient data enabling the calculation of *ES*, used qualitative and descriptive approaches (usually through case studies), were based on mere literature reviews, or lacked major details in regard to the nature of the therapy or the research design employed. In two cases, in which specific information was missing (i.e., unclear treatment for a comparison group, missing information about participants), the authors of the studies were contacted to complete the information. Furthermore, we found that the results reported in 5 of the 69 usable articles had been duplicated and published in other articles in this set; therefore, the information gathered from these studies were included only once in the analysis. The final data set, therefore, contained 64 articles. Most of them reported a single study; several articles, however, described two or more (up to four) studies, each of which differed by gender of patients (e.g., Christensen, Griffiths, Korten, Brittliffe, & Groves, 2004), intervention method (e.g., Carlbring, Ekselius, & Andersson, 2003), or another factor. In sum, the 64 articles reported on 92 independent studies (based on different patients) of various online interventions that were aimed at treating patients who suffered from a psychological problem or distress. This collection, then, contains the final data set for our meta-analysis. (The first author may be contacted for a list of keywords used in searching for articles and for a list of articles rejected from the data set used for the meta-analysis.)

In all, the 92 studies examined 11,922 participants, 9,764 of whom received some form of psychological intervention online. The number of patients in each study ranged from 6 to 2,341 (mean = 106; median = 28). Table 1 presents a summary of the basic characteristics

TABLE 1. Articles Included in the Meta-analysis

Author(s)	Problem Area	Online Channel & Format	N	Therapeutic Approach	Age & Type of Patients	Research Design	Outcome Measures	Findings	ES ¹ (CI ²)
Andersson et al. (2005)	Depression	Website and forum	36	CBT	Adults	RCT, compared to WL CG	SR of depression, anxiety, and quality of life	TG improved in all measures while no change in CG. Change maintained in 6-month follow-up	.67 (±.43)
Andersson, Lundström, & Ström (2003)	Recurrent headache	1. Website and e-mail	(1) 13	CBT	Adults	RCT, comparison of 2 TGs	Headache diary and SR of stress, anxiety, and depression	No change in headaches in both TGs; improvement in SR outcomes in both TGs	.23 (±.77)
Andersson, Ström, & Lyttkens (2002)	Tinnitus	2. Web-based and telephone support Website and e-mail support	(2) 17	CBT	Adults	RCT, compared to WL CG	SR of tinnitus annoyance, anxiety, and depression	Reduction in tinnitus annoyance and improved psychological measures	.32 (±.49)
Bruning Brown, Winzelberg, Abascal, & Taylor (2004)	Eating disorders	Website and forum	(1) 102 kids	PE	Adolescents and parents	TG vs. no-treatment comparison group	SR of eating disorders-related scales, knowledge test, and parents' attitudes	Improvement in all measures of TG compared to following treatment but not at 1-year follow-up. Parents attitudes' positively changed	.08 (±.34)
			(2) 22 parents						.57 (±.51)

Buhman et al. (2004)	Chronic back pain	Website and telephone support	22	CBT	Adults	RCT, compared to WL CG	SR of level of pain, depression, and anxiety	TG improved in some measures, attitudes, and ability to decrease pain but not in others. Some effects maintained at 3-month follow-up	-.04 ($\pm .55$)
Caribring et al. (2003)	Panic disorder	Website and e-mail	(1) 11	(1) CBT	Adults	RCT, compared to applied relaxation treatment	SR of agoraphobia, anxiety, depression, and quality of life; diary of attacks	TG improved in most measures, but was a little inferior to the improvement of the CG	.44 ($\pm .83$)
Caribring, Furmark, Steczkó, Eksellus, & Andersson (2006)	Social phobia	Website and e-mail	(2) 11	(2) Applied relaxation CBT	Adults	RCT, compared to WL CG	SR of social anxiety, general anxiety, depression, and quality of life	TG improved in all measures at posttreatment, and maintained or further improved at 6-month follow-up	.71 ($\pm .83$)
Caribring et al. (2005)	Panic disorder	Website and e-mail	25	CBT	Adults	RCT, compared to FTF treatment	SR of agoraphobia, anxiety, depression, and quality of life	Both treatment groups improved in all measures. Effects maintained at 1-year follow-up	.81 ($\pm .55$)
Caribring et al. (2001)	Panic disorder	Website and e-mail	20	CBT	Adults	RCT, TG compared to WL CG	SR of panic attacks and anxiety	Positive effects in TG in all outcome measures while no change in CG	.84 ($\pm .61$)
Cello et al. (2000)	Body dissatisfaction	Website and forum	24	PE	Female adults	RCT, compared to FTF treatment and to WL CG	SR of body and eating concerns and attitudes	Improvement pre- to posttreatment in all measures. Results maintained and continued to improve at 6-month follow-up	.27 ($\pm .73$)

(Continued)

TABLE 1. Articles Included in the Meta-analysis (continued)

Author(s)	Problem Area	Online Channel & Format	N	Therapeutic Approach	Age & Type of Patients	Research Design	Outcome Measures	Findings	ES ¹ (C ^{1/2})
Chiauzzi, Green, Lord, Thurn, & Goldstein (2005)	Binge drinking	Website	(1) 42	(1) CBT M	Adults	RCT, TG vs. WL CG CG instructed to read online articles on consequences of heavy drinking	SR of attitudes toward drinking, and drinking behaviors	Reduction of drinking and improved attitudes; effects continued and improved in 3-month follow-up	.61 (±.43)
Christensen, Griffiths, & Jorm (2004)	Depression	Website	(2) 63	(2) CBT F	Adults	RCT, 2 TGs vs. WL CG	SR of depression and knowledge of treatment	Both treatments effective in reducing depression symptoms	.48 (±.35)
			(3) 50	(3) PE M					.82 (±.39)
			(4) 60	(4) PE F					.51 (±.36)
			(1) 165	(1) PE					.66 (±.21)
Christensen, Griffiths, & Korten (2002)	Depression and anxiety	Website	(2) 182	(2) CBT	Adults	Pre-post and follow-up comparisons	SR of depression and anxiety	Reduction of depression and anxiety at each measurement point	.44 (±.21)
			(1) 30	CBT (1) M					.30 (±.51)
			(2) 48	(2) F					.45 (±.39)
(1) 102	CBT (1) F	1.03 (±.27)							
Christensen et al. (2004)	Depression and anxiety	Website	(2) 36	(2) M	Adults	Compared 2 TGs: experimental trial vs. use of open site	SR of depression and anxiety	Reduction of depression and anxiety of both groups	.84 (±.46)

Clarke et al. (2005)	Depression	Website and phone or postcard reminders	(1) 75	PE and (1) Postcard reminders	Adults	RCT, TG compared to no-treatment CG	SR of depression and utilization of health services	Reduction in depression over therapy period in comparison with CG. No difference in use of health services	.38 (\pm .31)
Clarke et al. (2002)	Depression	Website	(2) 80 144	(2) Telephone reminders PE	Adults	RCT, TG compared to no-treatment CG	SR of depression	No difference between TG and CG in changing over the research period	.53 (\pm .31) .04 (\pm .23)
Cohen & Kerr (1998)	Precounseling anxiety	Chat	12	Unspecified	Adults	TG vs. FTF	SR of anxiety	Anxiety decreased in both groups	.86 (\pm .80)
Day & Schneider (2002)	Various	1. Audio chat	(1) 26	CBT	Adults	TGs vs. FTF vs. WL CG	SR of complaints and functioning	Audio, video, and FTF were similarly effective	.91 (\pm .53)
Devineni & Blanchard (2005)	Chronic headache	2. Video chat Website and e-mail	(2) 27 39	CBT	Adults	RCT, TG vs. WL CG	SR of headache symptoms, depression, and anxiety	TG (of 2 versions) effective over CG. Results maintained in 2-month follow-up	1.05 (\pm .54) .36 (\pm .43)
Dew et al. (2004)	Heart transplant-related psychological symptoms	Website and forum	(1) 20	PE	Adult (1) patients	RCT, TG vs. CG	SR of depression, social functioning of patients, SR of hostility of caregivers	TG improved in all measures while CG did not change. Greater compliance of TG than CG with medical procedures	.53 (\pm .57)
			(2) 17		(2) caregivers				.86 (\pm .58)

(Continued)

TABLE 1. Articles Included in the Meta-analysis (continued)

Author(s)	Problem Area	Online Channel & Format	N	Therapeutic Approach	Age & Type of Patients	Research Design	Outcome Measures	Findings	ES ^a (CI) ^b
Etter (2005)	Smoking cessation	Website	(1) 2341	PE (1) Emphasis on health risk	Adults	RCT, comparison of 2 treatments	SR of smoking abstinence	Both treatments produced decrease in smoking, with advantage of 1st over 2nd intervention	.58 ($\pm .06$)
			(2) 1896	(2) Emphasis on nicotine replacement					.49 ($\pm .04$)
Farvolden, Denisoff, Selby, Bagby, & Rudy (2005)	Panic disorder and agoraphobia	Website and forum and e-mail	12	CBT	Adults	Pre-post TG	SR of panic attacks	Decrease in panic attacks for each consecutive stage	.60 ($\pm .80$)
Gollings & Paxton (2006)	Body image and disordered eating	Chat room and forum	20	CBT group therapy	Female adults	RCT, TG vs. FTF treatment	SR of body image, eating disorders, depression, anxiety, and self-esteem	Both groups improved in all measures with no mode difference	.78 ($\pm .62$)
Griffiths, Christensen, Jorm, Evans, & Groves (2004)	Depression	Website	(1) 136	(1) Information	Adults	RCT, TG vs. CG	SR of depression, stigma, thoughts	Intervention caused slightly reduced stigmatic attitudes of depression	.16 ($\pm .23$)
Harvey-Berino et al. (2002)	Overweight	Website and e-mail and chat room	(2) 121 30	(2) CBT Unspecified	Adults	RCT, TG compared to 2 FTF maintenance support	Body weight and adherence to treatment	FTF meetings for maintenance of weight loss treatment more effective than online intervention	.09 ($\pm .24$) .45 ($\pm .51$)

Harvey-Beirno, Pintauro, Buzzell, & Gold (2004)	Overweight and obese eating	Website and e-mail and chat room	77	Unspecified	Adults	RCT, TG compared to 2 FTF maintenance support	Body weight, adherence to treatment, and energy expense	Online intervention was as effective as 2 FTF support in maintaining treatment effects	.07 (\pm .31)
Hasson, Anderberg, Theorell, & Arnetz (2005)	Stress	Website and chat	129	CBT	Adults	RCT, TG compared to information-only CG	Physiological markers and self-report of stress management	TG improved over CG in most outcome measures	.29 (\pm .23)
Hirai & Clum (2006a)	Traumatic event	Website	13	CBT	Adults	RCT, TG compared to WL CG	SR of anxiety, depression, and impact of event	TG improved in all measures relative to CG	.62 (\pm .75)
Hopps, Pépin, & Boisvert (2003)	Loneliness (for people with disabilities)	Chat rooms, in groups of 2-3 patients	10	CBT	Adults	RCT, TG compared to WL CG	SR of loneliness and acceptance of disability	TG improved in all measures and exceeded CG. Results maintained in 4-month follow-up	1.18 (\pm .90)
Kenardy, McCafferty, & Rosa (2003)	Anxiety disorders	Website	36	CBT	Adults	RCT, TG compared to WL CG	SR of anxiety, depression, and related cognitions	Some improvement was found, unrelated to treatment	.61 (\pm .43)
Kenardy, McCafferty, & Rosa (2006)	Anxiety disorders	Website	36	CBT	Adults	RCT, compared to WL CG	SR of anxiety, fear, depression, and related cognitions	Positive effects of treatment in most measures over CG, maintained in 6-month follow-up	.62 (\pm .45)
Kenwright, Marks, Gega, & Mataix (2004)	Phobia or panic disorder	Website and telephone support	10	CBT	Adults	Pre-post evaluation of TG	SR of fear, depression, and social adjustment	Patients improved in all outcome measures. Effects maintained at 1-month follow-up	1.09 (\pm .88)

(Continued)

TABLE 1. Articles Included in the Meta-analysis (continued)

Author(s)	Problem Area	Online Channel & Format	N	Therapeutic Approach	Age & Type of Patients	Research Design	Outcome Measures	Findings	ES ¹ (CI) ²
Klein & Richards (2001)	Panic disorder	Website	11	CBT	Adults	RCT, TG compared with NT CG	Incidents of panic attacks, SR of anxiety, depression, self-efficacy, and body vigilance	TG improved in most outcome measures while no changes in CG	.26 (±.63)
Klein, Richards, & Austin (2006)	Panic disorder	Website and	19	CBT	Adults	RCT, TG compared CGs of information and written manual	SR of panic attacks, anxiety, depression, body vigilance, and related cognitions	Effective changes to posttherapy and 3-month follow-up of both TG & written manual TC on most outcome measures, but not information TG	1.13 (±.64)
Kypri & McAnally (2005)	Hazardous health behaviors	Site-based assessment and prescriptive feedback	60	PE	Adults	RCT, TG compared to assessment only and minimal contact CGs	SR of behaviors	TG found effective in changing behaviors similar to assessment but better than minimal contact	.30 (±.36)
Kypri et al. (2004)	Hazardous drinking	Site-based assessment and prescriptive feedback	42	PE	Adults	RCT, TG compared to written material CG	SR of behaviors	Reductions in hazardous behaviors in 6 weeks and 6 months following treatment	.35 (±.43)
Lange et al. (2003)	Posttraumatic stress	Website	69	CBT	Adults	RCT, TG compared to WL CG	SR of behaviors and relevant emotions	Positive effects of TG on all outcome measures relative to CG; these maintained at 6-month follow-up	.92 (±.42)

Lange et al. (2000)	Posttraumatic stress	Website	20	CBT	Adults	Pre-post comparisons of TG	Trauma symptoms, anxiety, and depression	Positive effects of the treatment in all outcome measures, sustained 6-week follow-up	.86 ($\pm .62$)
Lenert, Muñoz, Perez, & Bansod (2004)	Smoking cessation	1. Website	(1) 70	PE	Adults	Comparisons of several time points between TGs	Percentage of smoke quitting	Higher smoking-quitting rates when e-mail messages sent to site users	.29 ($\pm .33$)
Lieberman (2003)	Jet lag	2. Website and e-mail Website	(2) 74	Prescriptive PE	Adults	Relationship between prescriptive treatment and symptom relief	SR of jet-lag-related symptoms	Negative correlation between compliance with intervention and severity of symptoms	.40 ($\pm .32$)
Lieberman et al. (2005)	Depression in Parkinson's disease patients	Chat room and forum for (1) homogeneous or (2) heterogeneous	(1) 17	PE and general support	Adults	Pre-post comparisons of 2 TGs	SR of depression and quality of life	Reduction in depression in homogeneous but not in heterogeneous groups	-0.01 ($\pm .67$)
Moor et al. (2005)	Binge drinking	E-mail	(2) 14 53	PE	Adults	TG compared with CG receiving written materials	SR of drinking behavior	Effective treatment evident in pre-post comparisons, similar in both groups	.52 ($\pm .74$) .17 ($\pm .38$)
O'Keamey, Gibson, Christensen, & Griffiths (2006)	Depression	Website	20	CBT	Adolescents	RCT, TG compared with WL CG	SR of depressive symptoms, attribution style, and self-esteem and related cognitions	Some positive moderate effects were found; only change in self-esteem sustained in 16-week follow-up	.19 ($\pm .68$)

(Continued)

TABLE 1. Articles Included in the Meta-analysis (continued)

Author(s)	Problem Area	Online Channel & Format	N	Therapeutic Approach	Age & Type of Patients	Research Design	Outcome Measures	Findings	ES ¹ (CI ²)
Owen, Klapow, Roth, Shuster, & Bellis (2005)	Anxiety and mood related to breast cancer	Website and forum	26	CBT	Female adults	RCT, TG compared with WL CG	SR of health-related quality of life, psychological and physical well-being	Weak effects of treatment from pre- to post-intervention and to 12-week follow-up	.19 (±.54)
Patten (2003)	Depression	Website	406	PE	Adults	RCT, TG compared with information-only CG	SR of depression	No effects of the intervention in either group	.04 (±.14)
Richards & Alvarenga (2002)	Panic disorder	Website	9	CBT	Adults	Pre- to 3-month following treatment comparisons	SR of panic and anxiety severity, body vigilance, and body sensations	Improvement in some of the outcome measures	.61 (±1.00)
Richards et al. (2006)	Panic disorder	Website and e-mail	(1) 12	(1) CBT	Adults	RCT, 2 TGs compared with information-only CG	SR of panic severity, depression, anxiety, agoraphobic cognitions, body vigilance, and quality of life	Positive improvement in all measures were found equally in both TGs compared to CG; these effects sustained at 3-month follow-up	.78 (±.80)
Ritterband et al. (2003)	Encopresis	Website	(2) 11 (3) 9 12	(2) CBT and stress management (3) information PE and behavioral	Children	RCT, TG compared with comparison group that received routine medical care	Relevant knowledge, encopresis, incidents, and toilet habits	Effective change in most outcome measures relative to pretreatment and to CG	-.10 (±.92) .65 (±.80)

Robinson & Serfaty (2001)	Eating disorders	E-mail	19	CBT or eclectic	Adults	Pre- to posttreatment comparison	SR of depression, and symptoms of eating disorders	Effective change in all measures from pre- to posttreatment	.37 (\pm .58)
Rothert et al. (2006)	Weight management	Website	(1) 438	(1) Tailored behavior	Adults	RCT, compared TG to information-only CG	Body weight	Reduced body weight in TG more than CG, at both 3- and 6-month follow-up assessment	.19 (\pm .13)
Schneider et al. (2005)	Phobic and panic disorders	Website	(2) 429 (1) 33	(2) PE (1) CBT, with exposure	Adults	RCT, compared 2 TGs	SR of state of problem and evaluation of fear by blind assessor	Both TGs equally improved at posttreatment on most measures, but TG(1) sustained better outcome at 4-week follow-up	.08 (\pm .13) 1.31 (\pm .50)
Streicher et al. (2005)	Smoking cessation	Website and e-mail	(2) 15 (1) 446	(2) CBT, self-management without exposure (1) Tailored CBT	Adults	Compared 2 TGs at 6 and 12 weeks following intervention	SR of smoking abstinence	Over 20 percent abstinence on 28-day continuous rates in both groups, with advantage to tailored intervention	1.68 (\pm .13)
Ström, Patterson, & Andersson (2000)	Recurrent headache disorders	Website and e-mail	(2) 418 20	(2) Nontailored CBT CBT	Adults	RCT, TG compared with WL CG	Headache diary and effects and depression	Reduction in headache severity and depression	1.43 (\pm .14) .41 (\pm .59)

(Continued)

TABLE 1. Articles Included in the Meta-analysis (continued)

Author(s)	Problem Area	Online Channel & Format	N	Therapeutic Approach	Age & Type of Patients	Research Design	Outcome Measures	Findings	ES ¹ (CI) ²
Ström, Patterson, & Andersson (2004)	Insomnia	E-mail and web page	30	CBT	Adults	RCT, TG compared with WL CG	Sleep diary, depression, and anxiety	Improved sleeping quality	.32 (±.44)
Swartz, Noell, Schroeder, & Ary (2006)	Smoking cessation	Website	87	PE	Adults	RCT, TG compared with WL CG	Smoking abstinence	Abstinence rate of TG was higher than in CG at 3-month follow-up	.45 (±.28)
Tate, Jackvony, & Wing (2003)	Weight loss	1. Website	(1) 46	Behavioral	Adults	RCT, 2 TGs compared pre- to posttreatment	Body weight and waist circumference	Both TGs improved in outcome measures; 2nd group was more successful	.25 (±.41)
Tate, Wing, & Winett (2001)	Weight loss	2. Website and e-mail 1. Website	(2) 46 (1) 30	(1) PE	Adults	RCT, 2 TGs compared pre- to posttreatment	Body weight and waist circumference	Both TGs improved in outcome measures; 2nd group was more successful	.44 (±.41) .43 (±.49)
Wade, Wolfe, Brown, & Pestian (2005)	Traumatic brain injury	2. Website and e-mail Website and webcam	(2) 32 (1) 6	(2) Behavioral CBT	(1) Parents	Pre- to posttreatment comparisons	Child adjustment, parent-child conflicts, family functioning	Small improvement in most outcome measures	.46 (±.48) .65 (±.98)
			(2) 8		(2) Children				.44 (±.113)

White et al. (2004)	Weight loss	Website or website and e-mail	(1) 29	(1) PE parents and adolescents	RCT, 2 TGs compared pre- to posttreatment	Body mass index, weight, body fat	TGs improved in all measures over 6 months, both in children and parents, more successful in behavioral TG	-.01 ($\pm .51$)												
									(2) 28	(2) PE adolescents	RCT, TG compared with no-treatment CG	SR of body shape, eating disorders, and weight and shape concerns	No differences between groups, but some advantage to TG at 3-month follow-up	.46 ($\pm .60$)						
															(3) 29	(3) Behavioral parents	RCT, TG compared with manual treatment CG	Weight, biochemical data, and SR of quality of life	More changes in CG than in TG	.36 ($\pm .58$)
Winzelberg et al. (2000)	Body image	Website and forum	24	CBT	Adults															
			15	Behavioral	Female adults															
Womble et al. (2004)	Weight loss	Website and e-mail and forum	15	Behavioral	Female adults															
Woodruff, Edwards, Conway, & Elliott (2001)	Smoking cessation	Chat room	18	Client-centered	Adolescents															
Zabinski et al. (2001)	Eating pathology and body-image dissatisfaction	Website and forum	27	PE	Female adults															

(Continued)

TABLE 1. Articles Included in the Meta-analysis (continued)

Author(s)	Problem Area	Online Channel & Format	N	Therapeutic Approach	Age & Type of Patients	Research Design	Outcome Measures	Findings	ES ¹ (CI ²)
Zabinski, Wilfley, Calfas, Winzelberg, & Taylor (2004)	Eating pathology and body-image dissatisfaction	3 chat rooms	28	PE	Female adults	RCT, TG compared with WL CG	Body mass index, eating disorders, body image	Improvement of TG in most outcome measures, sustained at 10-week follow-up	.53 (±.51)
Zetterqvist, Maanmies, Ström, & Andersson (2003)	Stress	Website	23	CBT	Adults	RCT, TG compared with WL CG	SR of stress, social support, anxiety, and depression	Improvement of TG in most outcome measures, but some improvement in CG too	.70 (±.53)

Note: ES = effect size; CBT = cognitive-behavior therapy; PE = psychoeducation; FTF = face-to-face; RCT = randomized controlled trial; SR = self-report; TG = treatment group; CG = control group; WL = waiting list; NT = no treatment. N = number of participants receiving online treatment in the statistical analyses.

¹ES = average of effects of outcome measures used in each study.

of the studies included in the analysis. The interventions analyzed were evaluated by a total of 746 measures of effects. Some studies were evaluated by a single outcome measure (e.g., Cohen & Kerr, 1998), whereas others were assessed by several measures, up to as many as 21 (Buhrman, Fältenhag, Ström, & Andersson 2004). On the average, the studies used eight measures to determine the effectiveness of treatment.

Coding of Moderators

Two coders independently coded various study features as possible moderators of effects, based on theoretical or methodological considerations. Interrater consensus between the coders revealed a 95 percent agreement. In cases of disagreement or lack of coherence, a third rater was involved to reach a final, agreed-on rating. The three coders held either masters or doctorate degrees in the behavioral sciences. As mentioned, when the study provided insufficient data with respect to a specific moderator, it was coded as absent and not included in the final analysis. Moderator analyses were performed to examine whether the *ES* of an intervention or a group intervention could be explained by moderating variables. In cases in which a specific moderator resulted in more than two separate groups, it was designated as a moderating variable if the analysis revealed significant heterogeneity between two of the groups, each of which displayed within-group homogeneity (Hedges & Olkin, 1985). A minimum of five cases in a category allowed for a meaningful test of homogeneity (Voyer, Voyer, & Bryden, 1995); however, not all of the coded moderators were used because of the small number of studies in some of the categories.

To avoid sample-size bias, once Hedge's *g* was calculated for a given variable, the corresponding *ES* was weighed according to the number of participants included in the *ES* calculation. These calculations were performed by means of the D-STAT program and according to the formulas developed by Hedges and Olkin (1985).

After the mean weighed *ES* was calculated, tests of homogeneity were performed to determine whether the *ES*s could be considered to share a common population *ES*. If *Q* statistics were significant, homogeneity would be rejected for the *ES*s within the given set and moderator analyses conducted to identify the sources of systematic

variations among the *ESs*. In these calculations, the moderator variables represent the independent variables, while the effectiveness of the interventions represents the dependent variables. Moderator analyses were performed as follows: First, the mean effect size and the value of within-group homogeneity ($Q_W = \text{within}$) were calculated for each category of the moderator variables. Next, the degree of homogeneity between the moderator categories ($Q_B = \text{between}$) was calculated. A moderator variable is considered to explain the variance of an effect set if the value of Q_W is not significant while the value of Q_B is significant.

Calculation of Effect Size

The data collected from the 92 studies investigated were converted into a uniform, standardized format to enable a quantitative synthesis by means of meta-analytic calculations, using the fixed-effects method. The studies contained 746 measures of effects of the interventions employed. The intervention *ES* of each of the 746 measures was computed through statistical procedures developed by Hedges and Olkin (1985) and additional mathematical solutions for nonsignificant *ES* (Rosenthal, 1984).

In several cases, some data were missing. We then calculated the *ES* of the effects of individual measures on the available data. When data associated with a specific moderator were missing, we either omitted missing data or included it in the “other” category in presenting the results.

After computing *ESs* for all measures and the average *ES* for each of the studies, we examined as a common procedure in meta-analysis the distribution of effects to detect outliers. Although three of the 92 mean effects were detected as outliers, we decided not to exclude these studies for the following reasons: First, the mean weighted *ES* did not change when outliers were excluded. Second, it became clear when analyzing moderating effects that the outliers’ *ESs* significantly associated with moderator interaction, thus excluding the possibility that these studies could actually damage the explanatory value of our review. In other words, the outliers actually contributed to the homogeneity of variance rather than the opposite—the main reason for discarding outliers. Thus, our decision is consistent with statistical requirements and reasoning (Fuller & Hester, 1999; Hedges & Olkin, 1985).

RESULTS

The average weighted *ES* over all 92 studies, across all dependent measures, was 0.53, which is considered to be a medium effect (Cohen, 1988). As can be observed in Table 1, average effects varied greatly from study to study, from a minimum *ES* of -0.10 (Richards, Klein, & Austin, 2006; treating panic disorder through online information alone) to a maximum of 1.68 (Strecher, Shiffman, & West, 2005; treating smoking cessation through tailored CBT). The *ES*s also showed extreme variations along other variables, especially through the 746 dependent measures: from a low of -2.90 (self-report of pain severity in treating chronic back pains; in Buhrman et al., 2004) to 5.10 (self-report of “total phobia” in follow-up versus pretreatment in treating phobic and panic disorders, both with and without exposure in using CBT; in Schneider, Mataix-Cols, Marks, & Bachofen, 2005). Out of the 746 effects calculated, 75 were zero or less (10 percent); out of the 92 mean *ES*s calculated per study, 5 (5.4 percent) were negative.

We then examined the moderation effects on *ES* of the various moderators in searching for meaningful interactions. The following sections present the moderating effects examined.

Type of Outcome Measure of Effectiveness

Effectiveness of treatments was measured in various ways: clients’ self-report questionnaires, reports of behaviors and activities, assessments and diagnostics by experts and raters, and physiological measures—all suited to the study and problem in question. Table 2 presents the comparison of *ES*s by type of dependent measure. The differences among *ES* by type of measure were highly significant

TABLE 2. Effect Size by Type of Outcome Measure

Type of Measure	<i>ES</i>	<i>n</i>	<i>N</i>
Evaluation by Expert	0.93	3	140
Behavior	0.61	26	6272
Self-Report	0.43	62	4518
Physical	0.19	26	1892
Other	1.54	8	222

Note: *ES* = effect size; *n* = number of effects; *N* = number of participants. Number of effects exceeds 92; some of the studies used more than one type of measure.

($Q_B = 226.42$; $p < .001$), varying from 0.93 (evaluation by experts and raters) to 0.19 (physical; e.g., blood pressure, brain waves). The “other” category yielded very high average *ES*, but this seems to be random, as there is no logical common denominator (e.g., number of visits to a general practitioner before and after treatment, therapist satisfaction). It seems that psychological treatments conducted online are less successful in producing problem-related changes that are physical or somatic in nature, such as blood pressure or weight. Without this type of effectiveness outcome measure, however, the average *ES* would apparently have increased significantly and become closer to what is considered high *ES*.

Type of Problem

Patients were treated for a variety of problems and psychological distresses (sometimes associated with medical-considered problems, such as back pains or headaches). We classified most of these problems into several meaningful categories; however, eight specific problems (e.g., insomnia) remained in the “other” category. As may be viewed in Table 3, average *ES* yielded significant variations among the problem categories ($Q_B = 197.98$; $p < .001$). While post-traumatic stress disorder (PTSD) (mean *ES* = 0.88) and panic and anxiety disorders (mean *ES* = 0.80) were treated most effectively, weight loss received the least effective treatment (*ES* = 0.17). Thus, it looks as if Internet-based interventions are better suited to treat problems that are more psychological in nature—that is, problems

TABLE 3. Effect Size by Type of Problem

Type of Problem	<i>ES</i>	<i>n</i>	<i>N</i>
PTSD	0.88	3	148
Panic and Anxiety	0.80	23	498
Smoking Cessation	0.62	8	5460
Drinking	0.48	6	351
Body Image	0.45	5	221
Depression	0.32	16	2500
Physiological	0.27	7	212
Weight Loss	0.17	16	1604
Other	0.55	8	1427

Note: *ES* = effect size; *n* = number of effects; *N* = number of participants; PTSD = post-traumatic stress disorder

dealing with emotions, thoughts, and behaviors—and less suited to treat problems that are primarily physiological or somatic (although these obviously have psychological components, too). If the latter categories were removed from the analysis, the average *ES* would have exceeded 0.6.

We examined possible confounding effects in that differential effectiveness might have been created by different therapeutic approaches, use of certain type of outcome measures, or other factors. We found no support for such confounding effects.

Time of Measuring Effectiveness

Most studies measured effectiveness right at the end of the therapy (i.e., posttreatment) or very close to it; a number of studies measured effectiveness in later follow-up, ranging from four weeks to a year after the end of therapy. The mean *ES* for post-therapy measurement, which involved 85 studies, was 0.52, whereas the mean *ES* of 33 studies that measured effectiveness at follow-up was 0.59. Despite the optical, apparent difference in favor of the follow-up effect, it was not found to be statistically significant ($Q_B = 2.46; p > .05$). The lack of difference means that effects of Internet-based interventions last for a longer time than just to the end of therapy, as should be expected of effective treatment intervention.

Therapeutic Theoretical Approach

Three main psychotherapeutic approaches characterized the studies being analyzed: CBT (intervention primarily based on a combination of changing thought patterns and contents, associated with rehearsal of related relevant behaviors), psychoeducational (intervention primarily based on providing information and explanations on a problem area and behaviors and emotions associated with it and prescribed instructions on how to change), and behavioral (intervention primarily based on modification and shaping of target behaviors based on learning principles). Table 4 presents the *ES*s by approach. Significant differences emerged among the therapy categories ($Q_B = 190.22; p < .001$), with the CBT ($ES = 0.83$) being found much more effective than the other approaches. The behavioral approach seems to be the least suited for online treatment ($ES = 0.23$). If behavioral approaches were left out of Internet

TABLE 4. Effect Size by Type of Theoretical Approach of Intervention

Type of Intervention	<i>ES</i>	<i>n</i>	<i>N</i>
Cognitive-Behavioral	0.83	51	3960
Psycho-educational	0.46	25	6796
Behavioral	0.23	14	1136
Other	0.65	2	30

Note: *ES* = effect size; *n* = number of effects; *N* = number of participants.

interventions, average *ES* would have increased, it seems, to a much higher level of effectiveness.

Here, too, possible confounding effects were examined to test that differential effectiveness was a result of other factors (e.g., presenting problem). We found no support for such confounding effects.

Age of Patients

We classified the age of clients into five age groups according to the data available from the articles (see Table 5). However, quite a few studies reported only an age range; hence, these data have to be referred to with caution. The effects of the data used for the analysis yielded significant differences among age groups ($Q_B = 181.23$; $p < .001$). An interesting *ES* pattern emerged, as youth and oldest adults seem to be less effectively treated ($ES = 0.15$ and 0.20 , respectively), whereas young (19–24) and older (25–39) adults seem to gain more from Internet-based therapy ($ES = 0.48$ and 0.62 , respectively).

TABLE 5. Effect Size by Age of Patients

Age Group	<i>ES</i>	<i>n</i>	<i>N</i>
18 and under	0.15	6	287
19–24	0.48	14	840
25–39	0.62	27	6941
40 and above	0.20	31	3172
Age not reported	0.63	14	682

Note: *ES* = effect size; *n* = number of effects; *N* = number of participants.

Form of Online Intervention: Web-based versus Etherapy

Internet-based therapy can be delivered mainly through a website (i.e., web-based therapy, using a number of intervention methods) or online communication (i.e., etherapy, through various communication channels and modalities). Although these two forms of delivering therapy are essentially different, they both use the Internet as a major vehicle for interacting with clients from a distance. Of the 92 studies, the mean *ES* of 65 studies that examined the effectiveness of web-based therapy was 0.54, which is not significantly different from the mean *ES* of 0.46 found for 27 studies that investigated the effectiveness of etherapy ($Q_B = 2.49$; $p > .05$). It is important to note that, generally, web-based and etherapy used similar theoretical approaches with similar patients (in terms of age and gender), with similar presenting problems, and were assessed by similar outcome measures, hence confounding effects are improbable.

Group versus Individual Therapy

The Internet enables delivering therapy in individual or group modes, just as in face-to-face therapy. However, whereas web-based therapy is conducted individually, etherapy in principle (aside from possible supplements of group support offered occasionally in this form of therapy) may be conducted either individually (through various communication channels, such as e-mail and personal chat) or in groups (through a forum or chat room). Table 6 compares the mean *ES* of individual (in web-based therapy and in etherapy) versus group (in etherapy) therapeutic modes. As can be seen in the table, individual therapy—whether delivered through web-based therapy or etherapy—was found to be more effective than group therapy ($Q_B = 7.34$;

TABLE 6. Effect Size of Individual versus Group Modes of Therapy

Mode	<i>d</i>	<i>n</i>	<i>N</i>
Individual—website	0.53	65	10523
Individual—etherapy	0.57	9	490
Group—etherapy	0.36	18	909

Note: *d* = effect size; *n* = number of effects; *N* = number of participants.

$p < .05$). The individual therapy mode marked 74 of the studies and yielded a mean ES of 0.54; group therapy, characterizing the remaining 18 studies, yielded a mean of 0.36, a statistically significant difference ($Q_B = 7.12$; $p < .01$). However, since only a small number of studies included in the analysis used group therapy, and the number of their participants was relatively small compared to the other therapy modes, the impact on the overall ES was marginal. Again, it should be noted that, generally, individual and group interventions were provided by similar therapeutic approaches to similar patients with similar problems and were assessed by similar outcome measures, hence the possibility for confounding effects is little.

Web-based Therapy: Interactive versus Static Website

Web-based therapy may be delivered through an interactive website, where users actively interact with the site according to its instructions and applications, or through a static website, where users passively receive information, instructions, and suggestions relating to their area of concern. Interactive sites are characteristic of CBT and the behavioral psychotherapeutic approaches, in which activating patients cognitively and behaviorally is essential. Static sites are more typical of psychoeducational or information-only approaches, which employ didactic and informative techniques. Our analysis found that of the 65 studies that investigated web-based therapy, the ES was 0.65 for 51 therapies that used interactive sites, which is significantly higher than the ES of 0.52 for the 14 interventions that used static sites ($Q_B = 32.07$; $p < .001$).

It should be noted that problem type were similarly treated by both types of therapies, therefore this factor should not be regarded as a possible confounding variable. However, as mentioned, interactive sites are more typical of CBT, whereas static sites are more typical of psychoeducational approaches, thus confounding might be possible in inferring from the differences reported here.

Web-based Therapy: Open versus Closed Website

Web-based therapy may be delivered through an open-access website, which permits anyone who desires to receive treatment to engage in it, or through a closed-access (filtered) website, for which patients are prescreened (according to various criteria) and the site is accessed only by personal authorization. Among the 65 web-based therapy

studies, the *ES* for 51 interventions that used closed sites was 0.68, which is significantly higher than the *ES* of 0.48 for the 14 interventions that used open sites ($Q_B = 50.40; p < .001$). This difference may be interpreted through several possible explanations, such as: web therapy does not fit every patient hence prescreening is essential, professional assessment should precede effective web-based therapy, and/or a closed site creates elevated commitment and motivation for therapy. Future research should look into these hypotheses.

Etherapy: Synchronicity of Communication

Etherapy can use either the synchronous communication mode—through chat, audio, or webcam—or asynchronous communication, via e-mail and forum. Of the 27 studies that investigated the effectiveness of etherapy, the mean *ES* of the 12 studies that studied the use of the synchronous communication modality for therapy was 0.49, whereas the mean *ES* of the 15 studies that investigated asynchronous therapeutic communication tools was 0.44. This difference was not found to be statistically significant ($Q_B = 0.20; p > .05$).

Etherapy: Type of Modality

The 27 studies that investigated the effectiveness of etherapy examined chat (nine studies), forum (eight studies), e-mail (seven studies), audio (two studies), and webcam (one study) as means of communication between therapists and clients. Table 7 presents the mean *ES* of each modality. The differences among the mean *ES* values were found to be significant ($Q_B = 55.16; p < .001$). It appears that chat and e-mail (both in the 0.50 s) were more effective than forum and

TABLE 7. Effect Size of Etherapy by Communication Modality (27 Studies)

Communication Modality	<i>ES</i>	<i>n</i>	<i>N</i>
Audio	0.91	1	54
Chat	0.53	9	231
Webcam	0.31	2	208
E-mail	0.51	7	383
Forum	0.34	8	523

Note: *ES* = effect size; *n* = number of effects; *N* = number of participants.

webcam (both in the 0.30 s). As the number of studies for this analysis is small and the common denominator between webcam and forum, unlike the other communication modalities, is not obvious, various speculations may be offered to account for these differences, such as reduced sense of privacy.

It should be noted that, generally, no systematic difference was present between the various modalities in terms of problem type, theoretical approach, or type of clients, hence confounding effects seem to be improbable. The small number of studies in each modality, however, does not allow further examination of this effect.

Contribution of Online Supplements to Main Treatment Mode

Several Internet-based treatment methods tried online supplements to accompany the main treatment modality, whether it involved the use of web-based therapy or any etherapy modality. In some studies, clients were offered the supplemental (and sporadic) use of e-mail (e.g., Carlbring, Westling, Ljungstrand, Ekselius, & Andersson, 2001) or a forum (e.g., Dew et al., 2004) in addition to the use of web-based therapy as the primary therapeutic method. In other studies, a complementary website to etherapy was offered that used e-mail (e.g., Moore, Soderquist, & Werch, 2005) or a forum supplement where chat was used as primary therapeutic communication channel (e.g., Gollings & Paxton, 2006).

In a comparison of studies that used a *website as a supplement* to other modes of treatment and those that did not, the supplementary websites were revealed in fact to have the possibility of *reducing* the effectiveness of the treatment (mean *ES* of 0.41 versus 0.54, respectively; $Q_B = 4.26$; $p < .05$). A further analysis showed no differences between supplementary-site types, open or closed, static or interactive.

Use of *e-mail as a supplement* to the main treatment modality, too, was found to be noncontributing, as mean *ES* of studies that used this method was 0.53, identical to the studies that did not e-mail as a supplement. Nor did the use of a *forum as a supplement* contribute to therapy effectiveness: the mean *ES* of the 15 studies that used this method was 0.44, the result of which was not different from the studies that did not use a forum supplement (mean *ES* = 0.54; $Q_B = 1.74$; $p > .05$).

Furthermore, the use of an online *audio feature as a supplement* did not contribute to therapy; in fact, it actually *decreased* the value

of *ES*. The mean *ES* of the eight studies that used this feature was 0.32, versus a mean *ES* of 0.54 for the studies that did not ($Q_B = 7.65$; $p < .01$). The use of *chat as a supplement* to the main treatment modality, too, had a *diminishing* effect: the six studies that used chat as a complementary channel of communication had a mean *ES* of 0.15, as opposed to a mean *ES* of 0.54 for the rest of the studies ($Q_B = 25.32$; $p < .001$). The use of a *webcam as a supplementary* channel revealed that this method *hindered* effectiveness, as the six studies that used it had a mean *ES* of 0.35, compared to a mean *ES* of 0.54 for the studies that did not ($Q_B = 3.74$; $p < .05$).

It should be noted that this finding does not necessarily pertain to causality, as various variables might moderate and be responsible for this difference. Several explanations may be provided as to why supplementary features seem not to significantly contribute to the effectiveness of therapy, such as: multichanneling of communication with clients may distract their focus and attention, and/or communication channels that reduce level personal sense of anonymity harm Internet-delivered therapy effectiveness. These (or other) hypotheses should be tested in future research.

Internet-Based versus Face-to-Face Therapy

Among the 92 studies included in the analysis, there were 14 that directly compared the Internet-based ($n = 940$) with the face-to-face ($n = 593$), traditional treatment of the same problem, with participants being assigned randomly to each treatment mode. While the average weighted *ES* of the Internet-based interventions was 0.39, the weighted *ES* of the face-to-face interventions was 0.34. This difference is not statistically significant ($Q_B = 0.32$; $p > .05$). It should be mentioned that there was no systematic factor or obvious reason why these particular studies yielded effects lower than the average of the rest of the studies; we thus assume there were no confounding effects involved in this analysis.

DISCUSSION

Overall Effectiveness of Internet-Based Interventions

The meta-analysis performed on 92 studies that investigated the effectiveness of Internet-based psychological interventions revealed

that, on the average, such an intervention has an *ES* of 0.53, or a medium effect. This average *ES* was found across different intervention methods and approaches, types of measure of effectiveness, problem areas, Internet channels and modalities, age of patients, and other variables. Our analysis of the interaction effects of moderators showed that the average *ES* could have been much higher if, for example, specific types of outcome measures (e.g., physical and physiological) were not employed. Actually, our examination showed that if studies used only the best (i.e., most improved) measures of effectiveness, the average weighted *ES* would have increased to 1.05, which is considered a very high *ES*. However, despite the poor effects on some of the outcome measures, despite that some psychological methods were found to be less appropriate for online application than others (e.g., behavioral), and despite that some problems are apparently less psychologically treatable through the Internet (e.g., weight loss), the average *ES* that we found, 0.53, is quite impressive. Incidentally, it should be mentioned that—generally parallel to our findings—some problems (e.g., weight loss) are less effectively treated by quite a few traditional, face-to-face therapeutic approaches too (Hardeman, Griffin, Johnston, Kinmonth, & Wareham, 2000; Shaw, O'Rourke, Del Mar, & Kenardy, 2007), hence these differences might not have to be attributed to the Internet as the mode of delivery of the intervention.

Our conclusion concerning the impressive nature of the level of effectiveness found is based on three foundations. First, on the average, face-to-face psychotherapeutic interventions are not significantly more effective in producing change in clients. Although quite a few studies showed that in-person therapy could attain a relatively high *ES* in treating certain problems in a specific population by using specific methods, the average effectiveness—parallel to the average *ES* of 0.53 found in our meta-analysis—was found to be of medium size, too. This finding is based on quite a few comprehensive reviews of the efficacy of psychotherapy, such as the Consumer Report study (see Seligman, 1995) and the comprehensive meta-analyses conducted by Smith and Glass (1977), Wampold and colleagues (1997), and Luborsky and colleagues (1999). Actually, if one summarizes all of the meta-analytic study results included in Lambert's and Ogles' (2004) comprehensive review of meta-analyses of the effectiveness of psychotherapy, one would find that the average of a medium-size effect best represents the results of the numerous studies. The

conclusion, then, is that Internet-based therapy, on the average, is as effective, or nearly as efficacious, as face-to-face therapy. In this context, Wampold's (2001) summation in regard to the effectiveness of traditional, face-to-face psychological interventions, "Simply stated, *psychotherapy is remarkably efficacious*" (p. 71; emphasis in original), would seem to apply, as well, to Internet-based psychological interventions.

Second, the data collected for our meta-analytic review revealed no difference in *ES* between Internet and face-to-face interventions when compared in the same study. In fact, the average *ES* of the Internet intervention in the 14 studies that made such a comparison was only 0.39—for some unknown reason, a lower than average *ES* of all the studies included in our meta-analysis—but the average *ES* of face-to-face interventions included in this data set was 0.34. This difference was not found to be statistically significant, thus supporting the contention that Internet interventions are as effective as parallel face-to-face psychological interventions.

Third, despite the common myth (Fenichel et al., 2002) that therapy cannot or should not be delivered through the Internet—especially because of the lack of visibility and of nonverbal communication cues and the absence of evidence for its effectiveness (e.g., Clinical Social Work Federation, 2001)—our findings clearly show that, in most cases, online therapy can be delivered effectively, by using various Internet applications and exploiting several online communication options. If we take into consideration that the use of modern computers and the Internet for therapeutic purposes is a relatively new professional pursuit, and if we add to this that computer and communication technologies have continuously and significantly developed over the past decade, and if we also pay attention to the fact that, generally, therapy professionals are relative novices to and lack advanced education and training in this area—the findings of the current meta-analysis are not only impressive but surprisingly, actually stand high.

Moderating Effects of Theoretical Approaches

The analysis of moderators revealed that several important variables significantly moderate the effectiveness of Internet therapy. Some of these findings are not surprising and were actually anticipated. For instance, it can reasonably be expected that the type of outcome measures is associated with the degree of effectiveness, as

this association is quite common in psychotherapy-outcome research (Hill & Lambert, 2004). In this context, it should be noted that expert ratings were found to be associated the most with effectiveness of interventions in the current meta-analysis. However, although “blind” raters were used in most studies, it makes sense that an expert’s evaluation might be the most sensitive (even if in principle biased) to therapeutic effects—a speculation that directly corresponds to the well-documented problem of reactivity of outcome measures (Smith, Glass, & Miller, 1980). The obvious, and simple, possibility that interviewers could become aware of a patient’s method of intervention and of his or her experiences in the process somewhat invalidates this type of outcome criterion or, at least, imparts to it a substantial bias. In this respect, therapist and/or researcher allegiance (Luborsky et al., 2002) might significantly affect any examination of effectiveness and influence ratings.

Our findings showed that CBT was more effective than other therapeutic approaches applied online, while behavioral techniques were much inferior. This finding—despite its saliency—is far from being simple. If we take into account that computer and Internet technology are advancing rapidly, we must consider that approaches having less of a text basis might not only become more attractive, they might even *elevate* effectiveness. For instance, Dallery and his associates (Dallery & Glenn, 2005; Dallery, Glenn, & Raiff, 2007; Glenn & Dallery, 2007) showed that behavioral treatment—using Skinnerian behavior-modification techniques and advanced remote technologies to bring about smoking cessation—can effectively be delivered through the Internet with exceptional success. (The first study cited was excluded from the meta-analysis for too few participants.) Additional examples are studies by Gold, Burke, Pintauro, Buzzell, and Harvey-Berino (2007) and Polzien, Jakicic, Tate, and Otto (2007), which recently presented highly effective behaviorally oriented web-therapy technique assisting in reducing clients’ body weight—both an approach and a problem area that were relatively inferior in our meta-analysis. In other words, it might be a question of time, skill, and method-development before a variety of clinical approaches is implemented online with a degree of effectiveness similar to CBT. For instance, Ritterband and colleagues (2006) showed that adding unique online tools (audio, graphics, interactivity) to previously developed, mainly textual interventions indeed contributed an added value to therapeutic efficacy.

Web-Based Therapy, ETherapy, and Additional Internet-Delivered Interventions

The number of studies that investigated the effectiveness of web-based therapy ($n = 65$) included in our review significantly exceeded those that studied etherapy ($n = 27$). Apparently, the reason for this difference has to do with the relative ease with which research can be conducted on web-based interventions than on etherapy. In web-based therapy, clients enter a site and follow instructions, including filling out online questionnaires at various points in time, whereas etherapy more resembles face-to-face therapy in that a client meets a therapist for a therapeutic dialogue; hence, in the latter practice, forms and questionnaires are perceived as irrelevant and a nuisance, and contacting patients for questionnaires and other measurements is usually troublesome and involves ethical and methodological difficulties in addition to practical problems. This difference between the two modes of Internet-based interventions, however, is in reversed direction to that of process research reviewed earlier. It is also interesting to note that the efficacy of etherapy—perhaps because of its basic, more natural therapeutic nature—has been in the subject of numerous nonquantitative studies, including illustrative descriptive case studies (e.g., Chechele & Stofle, 2003; Luce, Winzelberg, Zabinski, & Osborne, 2003) and advanced qualitative analyses (e.g., Stofle, 2002). These publications could not be included in our quantitatively based meta-analytic review; however, their existence should not be overlooked, especially as they provide much evidence in support of the application of etherapy in various online communication modalities and for numerous problem areas. These problem areas include individual therapy in treating such issues as marital difficulties (Jedlicka & Jennings, 2001), sex problems (Hall, 2004), addictive behaviors (Stofle, 2002), anxiety and social phobia (Przeworski & Newman, 2004), and eating disorders (Grunwald & Busse, 2003); and group therapy in treating diverse problems (e.g., Barak & Wander-Schwartz, 2000; Colòn, 1996; Przeworski & Newman, 2004; Sander, 1999). Perhaps this type of methodology better suits etherapy-type intervention, especially since experiential-oriented therapy is commonly applied (Suler, 2008). It seems that with the development and improved training in this emerging area (Coursol & Lewis, 2004; Mallen, Vogel, & Rochlen, 2005; Trepal, Haberstroh, Duffey, & Evans, 2007) therapeutic process and outcome will elevate.

Our findings showed that, on the average, web-based intervention provides as effective therapy as etherapy. This finding does not mean that both approaches are as effective in treating similar individuals and/or similar problems. Web-based therapy is focused on self-help; that is, individual people make use of therapeutic resources—be it online information, psychoeducation interventions, or a tailored, clinical protocol based on CBT principles—to change their condition. The essential role and responsibility of a therapist lie in preparing the materials and providing them online in a way that is attractive, friendly, and optimally effective. In etherapy, however, a therapist is actively engaged in therapeutic communication with clients and in exploiting the Internet for a channel of communication of choice (Suler, 2000, 2004, 2008). It is possible, therefore, that clients characterized by different preferences, needs, or habits would benefit differentially from each of these two approaches in interaction with the problem area. The absence of a meaningful difference in average effectiveness that we found between the two approaches might reflect the self-selection of patients and/or therapists; the available data cannot as yet provide answers to these questions. Future research should focus on these interesting hypotheses.

Very little research has been published on two other uses of the Internet to deliver therapy: Internet component(s) that may complement face-to-face therapy (e.g., use of e-mail in between face-to-face sessions, ask in-person clients to publish posts on a personal blog, use of a website to prepare clients for face-to-face therapy) and Internet-operated software (a programmed robot that simulates a therapist based on principles of artificial intelligence or prescribed protocols, such as ELIZA). These two category uses, in addition to web-based therapy and etherapy, create a comprehensive toolkit for therapists who wish to exploit Internet capabilities in their clinical work. However, only very limited outcome research has been published to date on the growing use of Internet-assisted therapy as a complementary therapeutic vehicle, such as using e-mail, blogs, online information, or an online support group in parallel with traditional, face-to-face therapy (Baily, Yager, & Jensen, 2002; Castelnuovo, Gaggioli, Mantovani, & Riva, 2003; Suler, 2008; Tate & Zabinski, 2004; Zuckerman, 2003). Findings published on such therapeutic use have been promising, however. For example, Baily and colleagues (2002) described the use of e-mail as an adjunctive treatment tool for an adolescent with anorexia nervosa and the use of a chat room for

the enhancement of social life for a patient with social phobia. Likewise, Peterson and Beck (2003) presented a model, and several illustrative cases, of the use of e-mail as an adjunctive tool in psychotherapy. Golkaramnay, Bauer, Haug, Wolf, and Kordy (2007) recently presented the use of group therapy, conducted through a chat room, following the termination of a patient's in-person therapy in order to reduce the risk of relapse. In regard to the category of more robotic, therapeutic online software (Marks, Cavanagh, & Gega, 2007), empirical outcome research is rare; however, descriptions of such applications exist, such as in helping the treatment of problem drinkers (Squires & Hester, 2004) or the more general use of ELIZA (Epstein & Klinkenberg, 2001).

Considerations of Age as a Moderating Factor

The differential effects of age group on Internet-based therapy outcome require special attention. The findings of the meta-analysis showed that clients' age made a difference in terms of their ability to gain from the therapy. Specifically, among four age-group categories employed, the findings showed that the *ES* of Internet-based therapy provided to mid-age adults (19–39) was higher than either to older or younger clients. This finding, however, might be a temporal result of a vanishing factor: that of pervasiveness, acceptance, and usage skills associated with the Internet. In other words, we believe that nowadays—after the general penetration of computers and the Internet into homes, schools, and workplaces—these differences might have disappeared. Actually, recent studies of Internet-based therapy for older adults and children—published after the end of the data collection for the current analysis (March, 2006)—showed strong therapeutic effects. For instance, using web-based CBT, Spence, Holmes, March, and Lipp (2006) showed highly effective results on anxious children, while Nelson, Barnard, and Cain (2006) gained similar results on depressive children. Hicks, von Baeyer, and McGrath (2006) presented highly effective online intervention for children's recurrent pains. Similarly, at the other end of the age continuum, Brattberg (2006) presented a highly effective, Internet-delivered, psychoeducation intervention in treating the chronic pains of older adults; Hill, Weinert, and Cudney (2006) showed highly effective web-based intervention of psychological symptoms of chronically ill older women. Lorig, Ritter, Laurent,

and Plant (2006) presented a highly effective online intervention program for developing the self-management skills of older adults suffering from chronic diseases; Marziali and Donahue (2006) very effectively treated older caregivers (mean age 68) through video-conferencing. Thus, it seems that an age gap interacting with online-intervention effectiveness is indeed vanishing.

Since cyberspace has become a major social environment for children and adolescents (Fox & Madden, 2006; Hall, 2006; Valkenburg & Peter, 2007), it is not surprising to learn that Internet-based therapeutic and support applications operating online are highly useful for youngsters (Barak, 2007; Hoffmann, 2006; Mangunkusumo, Brug, Duisterhout, de Koning, & Raat, 2007), in contrast to what our review seemingly found. Likewise, the use nowadays of computers and the Internet by older people is quickly growing (Carpenter & Buday, 2007); indeed, this age group may gain much mental support through computer use (Shapira, Barak, & Gal, 2007).

Limitations of the Meta-Analytic Review

Meta-analysis—although becoming a common procedure in reviewing quantitative empirical findings of various phenomena—is far from being a flawless procedure. It has been criticized on statistical and methodological grounds in the context of evaluating the effectiveness of psychotherapy (e.g., Wampold, 2001) and other, more general issues (e.g., Field, 2003). One of the main criticisms has to do with publication bias and “file-drawer effect,” created either by researchers themselves or by scientific journals, which results in an overestimation of effects. Although this point might be true, no doubt it affects face-to-face and Internet-based outcome research similarly; hence, a comparison of the two methods is not erroneous. In addition, it seems that the results of the moderator analyses that we conducted add to the validity of our conclusions. We considered using the “fail-safe N” (FSN) statistics in order to examine how many unpublished studies would have been needed to jeopardize our conclusions; we have avoided this step because of the clear nature of the results, on the one hand, and the problematic assumptions related to calculating FSN, on the other.

Another issue worth mentioning has to do with the statistical methods employed here. Since we used the fixed-effects method for our analysis, different results might be derived from those of the

random- or mixed-effects methods, throwing into question the accuracy of our results. However, if we compare our results with those of previous meta-analyses of Internet interventions—though these are more limited in scope and content (Hirai & Clum, 2006b; Spek et al., 2007; Wantland et al., 2004) but employ alternative statistical models and assumptions—we find that the general nature of our findings is highly consistent with those others, thus supporting the validity of our conclusions from this aspect, as well. Future research should utilize different statistical models to replicate our analysis.

Also, our data set for performing the meta-analysis included all eligible articles according to the inclusion criteria determined; quality of research, however, was not one of them. Using this criterion—suggested by some meta-analysis experts—might be problematic, especially as the objective and professional ability to assess quality of published research is limited and might be erroneous or biased. After close consideration and actual trials we decided to avoid this selection criterion and base research quality merely on acceptance for publication in a peer-reviewed journal. Our approach, however, might have introduced some error variance into the results. Future meta-analyses in this area should attempt to evaluate research quality of studies and either select those meeting a minimal level of this additional criterion or, perhaps in using a more informative approach, using research quality level as an additional moderator and examine its effects.

SUMMARY AND CONCLUSIONS

The findings presented in this meta-analytic review provide much support for the application of psychotherapeutic interventions through the Internet, using various approaches, methods, and online modalities, to treat various problems differentially but effectively; online therapy is especially effective for treating anxiety and stress—effects that last after therapy ends—and, on the average, is as effective as face-to-face intervention. The effectiveness of interventions can be detected by a variety of outcome measures, but less so when using physiological or physical measures. When web-based, self-help therapy is applied on an interactive website that may be accessed only by prescreened, authorized patients, it should increase therapy success. E-mail reminders for patients who use web-based

therapy are expected to contribute to the success of the therapeutic intervention, too. When etherapy is applied, it seems that textual are preferred to nontextual modes (e.g., use of audio and webcam), though this should be regarded cautiously due to the small number of studies reviewed using these features. Furthermore, it seems that individual Internet therapy is more effective than group intervention online.

The use of computers and the Internet is rapidly increasing and becoming a common personal and social phenomenon (Barak & Suler, 2008; Bargh & McKenna, 2004; Haythornthwaite & Hagar, 2004; Madden, 2006). Moreover, the Internet-connected computer is turning into a highly influential social tool (Sassenberg & Jonas, 2007) all while innovative and advanced technology is introduced frequently and is rapidly changing the culture. Psychotherapy and counseling should adjust to this changing world and adopt new, innovative tools accordingly to fit into the world of today and tomorrow so as to better meet clients' expectations and needs. The current review shows that this is not only theoretically possible but actually a developing professional reality.

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