Internet-delivered psychological treatments: from innovation to implementation

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Internet interventions, and in particular Internet-delivered cognitive behaviour therapy (ICBT), have existed for at least 20 years. Here we review the treatment approach and the evidence base, arguing that ICBT can be viewed as a vehicle for innovation. ICBT has been developed and tested for several psychiatric and somatic conditions, and direct comparative studies suggest that therapist-guided ICBT is more effective than a waiting list for anxiety disorders and depression, and tends to be as effective as face-to-face CBT. Studies on the possible harmful effects of ICBT are also reviewed: a significant minority of people do experience negative effects, although rates of deterioration appear similar to those reported for face-to-face treatments and lower than for control conditions. We further review studies on change mechanisms and conclude that few, if any, consistent moderators and mediators of change have been identified. A recent trend to focus on knowledge acquisition is considered, and a discussion on the possibilities and hurdles of implementing ICBT is presented. The latter includes findings suggesting that attitudes toward ICBT may not be as positive as when using modern information technology as an adjunct to face-to-face therapy (i.e., blended treatment). Finally, we discuss future directions, including the role played by technology and machine learning, blended treatment, adaptation of treatment for minorities and non-Western settings, other therapeutic approaches than ICBT (including Internet-delivered psychodynamic and interpersonal psychotherapy as well as acceptance and commitment therapy), emerging regulations, and the importance of reporting failed trials.

Key words: Internet interventions, cognitive behaviour therapy, innovation, anxiety disorders, depression, moderators and mediators, negative effects, blended treatment, implementation

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Modern information technology has changed the world and the way we interact with one another[1]. Computers were utilized early in psychotherapy research[2] and, with the advent of the Internet, use of computers in research and practice increased rapidly[3].

Clinical psychology and psychiatry have been influenced by these technological advances. Not only have Internet interventions become available, but so have websites providing information about psychiatric conditions[4], assessment procedures[5], and social forums related to psychiatric diagnoses[6]. More recently, modern mobile phones (smartphones) have facilitated data collection[7], increasing the reach and dissemination of therapeutic help. There are now literally thousands of smartphone apps dealing with mental health concerns, such as depression and stress[8,9].

The focus of this review is on Internet-delivered psychological treatments[10,11]. The first of these treatments were developed, evaluated and delivered as part of routine care in the mid-1990s[12]. Subsequently, the number of controlled trials of Internet-delivered psychological treatments has grown at a much faster rate than trials of psychotherapy in general. Most of the programs and research on Internet-delivered treatments have involved different forms of cognitive behaviour therapy (CBT), often referred to as ICBT[13].

TREATMENT APPROACH

There are numerous different versions of ICBT, but all require a treatment software platform to deliver and manage the intervention. This platform presents assessment instruments, treatment materials, and technology to facilitate interactions between a clinician and a client[14]. Treatment programs can deliver content in the form of text, video or audio, which are presented in the platform together with homework assignments, and interactions with a clinician and/or automated support functions (especially in the case of self-guided treatments). The layout of pages in the platform can be fully responsive, adapting to screen size and ensuring a fully-functional user experience regardless of whether the platform is accessed using a desktop computer, a mobile phone (smartphone) or a tablet[14].

Other important features of treatment software platforms include that they need to be able to regularly administer symptom questionnaires, which can be used to monitor progress, severity of symptoms, and possibly risk of self-harm[15]. Security of data is also crucial[16], in particular when there is an interaction between a client and a therapist via text or video chat and sensitive information is exchanged, and to record clinical notes.

The legal requirements for management of privacy of health-related data are rapidly evolving, but security requirements are generally similar to those for industries that involve electronic transmission of sensitive data, such as Internet banking (e.g., when bills are paid online), including encryption of data traffic and a double-authentication procedure at login[14].

Many programs include all components of an evidence-based psychological intervention[17]: for example, exposure instructions in the case of anxiety disorders and behavioural activation in the case of depression. Thus, some programs can include the equivalent of 150 pages of text, even if the material is presented online and with interactive features such as a quiz.

It has been possible to transfer a large proportion of common CBT techniques to the Internet format, with early programs sharing close similarities with bibliotherapy[18], and current ones being more easily readable on the screen or in the form of slide shows that present the principles of CBT via text and images[19].

While CBT has been the dominant model of therapy used in Internet interventions so far, different models have been and are being explored, including acceptance and commitment therapy[20], psychodynamic approaches[21], interpersonal psychotherapy[22], physical activity[23], mindfulness[24], and programs based on attention bias modification training[25].

A large proportion of studies and several implementations involve a clinician who guides the client through the program, provides feedback on homework assignments and also general support and answers to questions from the client[17]. The role of the clinician in ICBT has been investigated in many studies: overall, guided ICBT programs tend to be more effective than self-guided ICBT[26], even if some studies in which administrative contact is included tend to show that self-guided treatments can also produce clinically significant improvements[27,28].

While there are still few studies, there are indications that a practical and technical support may be sufficient[29], and that novice clinicians can be as effective as clinicians who have more experience with ICBT[30]. On the other hand, studies also show that what the therapist does is not irrelevant[31], and that a lenient therapist response to uncompleted homework assignments can be associated with less improvement in ICBT for generalized anxiety disorder[32]. Moreover, affirming responses to client e-mails can be associated with better outcomes in ICBT for depression, and the same seems to happen if the therapist is self-disclosing[33], just to give two examples. To increase fidelity and therapist efficacy, guidelines can be developed and followed which facilitate both research and clinical training[34].

Several studies have investigated the role of therapeutic alliance in ICBT[35], with a focus on agreement with regard to tasks and goals as well as the bond between the therapist and the client[36]. While some studies show a small but statistically significant association between early alliance ratings and outcome in ICBT[37], other studies fail to find this[38]. Overall, high alliance ratings have been reported, suggesting that clients do develop a relationship with their online therapist. However, there are problems with this research, in that it is likely that alliance is rated in relation to the whole program and not just to the relatively minor interactions between the client and the therapist[39]. Further, with the exception of a study on blended face-to-face and ICBT[40], studies have not involved observer-rated alliance.

INNOVATION

One aspect of Internet-delivered interventions, including ICBT, is the possibility of rapid clinical innovation, a hallmark of science as there is often room for improvement in treatment research[41]. Psychotherapy research has most likely suffered from the high costs involved with running controlled trials, and one advantage of conducting studies online is lower costs and shorter study periods.

First, recruitment is usually much faster than in ordinary clinical trials, in part because it is not geographically confined. Second, diagnostic procedures are often performed from a distance, with structured telephone interviews complementing the self-reported data gathered through the use of validated online questionnaires[42]. Third, by using online materials that provide a significant proportion of the therapeutic content, the actual time devoted to each client is much less than in face-to-face treatment research, with an average of 10 min per client and week versus the traditional 45 min weekly sessions. There is no need for a therapy room, and clients do not need to wait to the same extent as in a face-to-face study. Further advantages are the possibility to repeat a lesson/module and the faster access to support if needed.

Researchers in this field often start by conducting a randomized controlled trial (RCT), sometimes referred to as a "pilot RCT"[43], but not necessarily having smaller samples than in older psychotherapy trials, which were often underpowered[44]. Some researchers perform open pilot studies before running a controlled trial[45], but, as a controlled trial is more likely to give clearer answers regarding effects, and still does not cost more than a pilot trial, there is a tendency to skip this open testing once a treatment has been developed.

Phase IV open studies with no control groups have an important role to play in clinical effectiveness research[46], when it is not feasible or even possible to randomize clients. Investigations of Internet interventions can also use qualitative methods, including interviews of individuals who have completed the treatment[47]. Such studies are on the increase. What is lacking, however, are detailed case descriptions and, to the best of our knowledge, there are very few case studies on Internet interventions[48].

Given the large sample sizes that can be obtained in Internet interventions research, the possibility has emerged to conduct factorial design trials instead of the ordinary treatment versus control trials. In factorial research designs, it is possible to answer more than one question, as two or more independent variables (or factors) are tested within the same study, leading to two or more main effects and possible interaction effects between conditions. At a minimum, this leads to a design with four experimental conditions (or groups). For example, two different forms of ICBT for depression (behavioural activation vs. cognitive therapy) could be compared as well as two different ways to provide support (scheduled vs. on request).

There are various versions of factorial designs[49], and several such studies are in progress[50,51]. The use of factorial designs is likely to speed up the development of new interventions and treatment components. However, even current Internet interventions research can be viewed as an engine for innovation, with treatments being developed and tested directly for Internet delivery instead of first being tested as a face-to-face treatment. One such example is a recently developed treatment for procrastination[52].

The possibility to recruit patients without geographical barriers also presents opportunities for testing psychotherapy for people with conditions and problems (e.g., spinal cord injury, epilepsy) that can be highly disabling while also having a relatively low prevalence, making them very difficult to study feasibly in face-to-face trials[53].

EVIDENCE BASE TO DATE

The evidence base for ICBT, and for Internet interventions in general, has increased rapidly, making separate systematic reviews for different conditions necessary. There are now as many as 300 controlled trials of Internet interventions (including unpublished studies), for different disorders and target populations, and the number continues to increase.

Early reviews tended to focus more broadly on the effects of ICBT[54], or on computerized interventions in general[55]. It is still common to mix different technologies in reviews, which can be problematic, as there are differences between computerized treatments delivered in a clinic and ICBT involving contact from a distance.

Some contemporary reviews focus on the effects of Internet interventions for specific disorders or conditions, different target populations, and on specific forms of psychological treatments, such as, for example, acceptance and commitment therapy[56]. Another recent trend is to conduct individual participant data meta-analyses, by pooling the raw data from different research groups, which facilitates moderator analyses[57].

A common problem when reviewing the literature on Internet interventions, including ICBT, is the use of different terms to describe the interventions, for example digital therapy, Internet interventions, and computerized psychotherapy. Other terms, such as web-based psychotherapy and online psychotherapy, are also commonly used. This has been referred to as "terminology chaos"[58], and there are no signs that it will be solved since, for example, smartphone delivery and virtual reality are now sometimes being seamlessly combined with the more standard Internet format[59].

Concerning anxiety disorders, several systematic reviews and meta-analyses are available, with a Cochrane review on therapist-delivered ICBT being one of the most recently updated[60]. This included randomized controlled trials of therapist-supported ICBT compared to a waiting list, attention, information or online discussion group; unguided CBT; or face-to-face CBT. Studies on adults with panic disorder, agoraphobia, social phobia, post-traumatic stress disorder (PTSD), acute stress disorder, generalized anxiety disorder, obsessive-compulsive disorder, or specific phobia, defined according to DSM-III/III-R/IV/IV-TR or ICD-9/10, were included. The standardized mean difference (SMD) for disorder-specific anxiety symptoms (22 studies, 1,573 participants) and general anxiety symptoms (14 studies, 1,004 participants) at post-treatment favored therapist-supported ICBT over waiting list, attention, information, or online discussion group only (respectively, SMD=–1.12, 95% CI: –1.39 to –0.85 for disorder-specific anxiety symptoms; and SMD=–0.79, 95% CI: –1.10 to –0.48 for general anxiety symptoms). The quality of the evidence, however, was rated as low. There was no significant difference between therapist-supported ICBT and face-to-face CBT for either disorder-specific anxiety symptoms (6 studies, 424 participants, SMD=0.09, 95% CI: –0.26 to 0.43) or general anxiety symptoms (5 studies, 317 participants, SMD=0.17, 95% CI: –0.35 to 0.69) at post-treatment. Again, the quality of the evidence was rated as low.

This is in line with a more recent review by Andrews et al[61], in which the Hedges' g for ICBT or computerized CBT (cCBT) compared to care as usual, waiting list, information control, psychological placebo or pill placebo was 1.31 (95% CI: 0.85 to 1.76; 12 studies) for panic disorder, 0.92 (95% CI: 0.76 to 1.08; 11 studies) for social anxiety disorder, and 0.70 (95% CI: 0.39 to 1.01; 9 studies) for generalized anxiety disorder. Nine studies compared ICBT to face-to-face CBT (568 subjects in total), and the difference was found to be not significant (g=0.14 in favor of face-to-face CBT, 95% CI: –0.04 to 0.32).

Overall, these data seem to suggest that therapist-supported ICBT is more efficacious than control conditions for anxiety disorders, and not significantly different from face-to-face CBT, although further evidence of a better quality is needed.

Several separate reviews have been published on, for example, PTSD[62], in which the pooled between-group effect size with treatment against waiting list control was g=0.71, based on 10 studies and 1,139 participants. There is also a recent review on the effects of ICBT for children and adolescents[63], which included 24 studies and found a moderate effect size against control conditions (g=0.62).

Concerning depression, Andrews et al[61] found an Hedges' g for ICBT or cCBT compared to care as usual, waiting list, information control, psychological placebo or pill placebo of 0.67 (95% CI: 0.51 to 0.81), based on 32 studies. Josephine et al[64], in a systematic review and meta-analysis focusing on Internet- and mobile-based interventions in adults with diagnosed depression, compared with waiting list or attention placebo, found that only 19 studies were eligible for inclusion (i.e., included patients with diagnosed major depression). Internet- and mobile-based interventions had a significantly greater impact on depression severity compared to waiting list at the end of treatment (g=–0.90, 95% CI: –1.07 to –0.73).

A recent meta-analysis of individual participant data[65] managed to get the raw data from 13 randomized controlled trials (3,876 participants) in which self-guided ICBT was compared with a control condition (usual care, waiting list or attention control) in individuals with symptoms of depression. Self-guided ICBT was significantly more effective than control conditions on depressive symptoms severity (g=0.27) and treatment response (odds ratio=1.95, 95% CI: 1.52 to 2.50). These effect sizes seem to confirm the results of older reviews suggesting that self-guided ICBT tends to be less effective than therapist-guided ICBT[66].

One approach to ICBT is to tailor the intervention according to the patient profile, which is a way to handle comorbidity

between disorders. An alternative is to use a transdiagnostic approach targeting the underlying mechanisms of several disorders (e.g., avoidance). Both approaches have been tested in ICBT research, and a meta-analysis of studies dealing with anxiety and depression, including 19 controlled trials and 2,952 participants, found an average effect size against control conditions of g=0.82 (95% CI: 0.58 to 1.05) for anxiety and g=0.79 (95% CI: 0.59 to 1.00) for depression. There were no substantial differences between transdiagnostic and disorder-specific treatments[67].

In addition to studies on psychiatric conditions, there is a large literature on various health problems, such as chronic pain[68], insomnia[69], tinnitus[70], and stress[71], just to mention a few examples. There are also studies on addictions[72].

Many studies point in the direction of equivalent effects of guided Internet interventions and face-to-face treatments, but this question can only be addressed by direct comparisons. In an updated meta-analysis of a previous review[73], 20 studies in which participants had been randomly assigned to guided ICBT for psychiatric and somatic conditions or to face-to-face CBT were included[74]. The pooled between-group effect size at post-treatment was g=0.05, suggesting that ICBT and face-to-face treatment produce equivalent effects.

While early studies of unguided ICBT suffered from high dropout rates (a weighted average of 31% of the participants dropped out of treatment in 19 studies of Internet-based treatment programs for psychological disorders)[75], a recent meta-analysis of ICBT for adult depression[76], including 24 studies, found that participants in guided ICBT completed on average 80.8% of their treatment, which did not differ significantly from participants in face-to-face CBT (83.9%, p=0.59). However, the percentage of completers (total intervention) was significantly higher in face-to-face CBT (84.7%) than in guided ICBT (65.1%, p<0.001).

There are also studies in which the long-term effects of ICBT have been investigated. A recent review included 14 trials in which data had been collected for a follow-up period of two years or longer after completion of treatment. The included studies had an average follow-up period of three years[77]. There were long-term outcome studies on panic disorder, social anxiety disorder, generalized anxiety disorder, depression, mixed anxiety and depression, obsessive-compulsive disorder, pathological gambling, stress, and chronic fatigue. The pre- to follow-up effect size was g=1.52.

In sum, the literature on Internet interventions and ICBT is growing, guided ICBT tends to be as effective as face-to-face CBT, and the effects are likely to be sustained over time.

HARMFUL EFFECTS

While hardly being noticed (and perhaps even dismissed for a long time), the possibility of negative effects during and following psychotherapy has more recently been investigated in relation to ICBT[78]. Negative effects are increasingly documented in association with controlled trials of ICBT, but there are also separate reports of negative effects.

One example is a patient-level meta-analysis[79], which included 2,866 patients from 29 clinical trials of ICBT. Using the Reliable Change Index, the deterioration rate was 5.8% in the treatment and 17.4% in the control conditions (odds ratio=3.10, 95% CI: 2.21 to 4.34). Being in a relationship, being older and having at least a university degree were associated with lower odds of deterioration, but only in patients assigned to the treatment condition.

Another patient-level meta-analysis focused on self-guided Internet treatments for depression[80], and found that, of the 3,805 participants analyzed, 5.8% in the treatment groups and 9.1% in the control groups had deteriorated (odds ratio=0.62, p<0.001). No examined moderators were significantly associated with the deterioration rate.

In a similar patient-level analysis on guided ICBT[81] (18 studies, 2,079 participants), the deterioration rate was 3.36% in the treatment groups and 7.60% in the control groups (relative risk=0.47, 95% CI: 0.29 to 0.75). Patients with lower education presented a higher risk for deterioration than those with higher education.

Overall, these rates of deterioration appear similar to those reported in face-to-face treatments[78]. However, it is important to note that our methods for exploring negative effects are still limited and, for example, relatively little is known about the causes (e.g., the intervention itself, factors outside of the intervention) of the negative effects observed during Internet interventions. Negative effects other than symptom deterioration may also occur in ICBT and should be documented, for example by using open-ended questions or self-report measures covering adverse and unwanted events[79].

MECHANISMS OF CHANGE AND PREDICTORS OF OUTCOME

As would be expected from the literature on face-to-face psychotherapies[82], there are no consistent predictors or change mechanisms reported in Internet interventions research. We have reviewed above the literature on therapeutic alliance, in which the results have been inconsistent. In addition, studies have been conducted on genetic variables, but findings have not been promising[83].

One study[84] hypothesized that a greater cognitive flexibility would provide a better foundation for learning and implementing the cognitive restructuring techniques used in ICBT, leading to better treatment outcomes. Data from three samples including patients with depression, social anxiety disorder and tinnitus were used. The 64-card Wisconsin Card Sorting Test (WCST) was administered prior to treatment. There was no significant association between perseverative errors on the WCST and treatment gains in any group.

However, another study[85], conducted on 66 older adults with mixed anxiety depression randomized to ICBT or control conditions, who were administered the WCST (perseverative errors) and the Cognitive Failures Questionnaire before treatment, reported a moderate between-group effect on the main

outcome measure, the Beck Anxiety Inventory (d=0.50), favoring the treatment group. The authors concluded that the role of cognitive functioning in the outcome of ICBT should be further investigated.

Perhaps more promising, but still very preliminary, are studies on brain imaging. One study[86] showed that the long-term outcome of ICBT for social anxiety disorder could be predicted by blood oxygen level-dependent (BOLD) responses to self-referential criticism in the fear-expressing dorsal anterior cingulate cortex and amygdala regions at pre-treatment, analyzed using a support vector machine learning approach. Another study[87] found that larger pre-treatment right rostral anterior cingulate cortex volume was a significant predictor of greater depressive symptom improvement on ICBT, even after controlling for demographic and clinical variables previously linked to treatment response.

Various demographic characteristics have been investigated as well, with mixed findings. It is common to find that variables such as age, gender, marital status, computer skills, educational level, and having children have no significant predictive value[88].

There are other possible mediators of outcome more directly related to the actual treatment process, and factors that are likely to influence uptake and adherence to treatment. For instance, it has been reported that Internet therapy is more effective when the treatment is user friendly and not overly technically advanced, and a clear deadline is provided for the duration of the treatment[89]. Furthermore, sudden gains (i.e., large and stable improvements occurring between two consecutive treatment sessions) have been found to predict larger improvements at both post-treatment and one-year follow-up in patients receiving ICBT for severe health anxiety[90]. Design features of ICBT could also be important: a systematic review[91] found that "persuasive technology" elements (such as more extensive employment of dialogue support) significantly predicted better adherence to treatment.

ICBT has been also conceptualized as a form of patient education. Studies have investigated whether ICBT influences knowledge acquisition in social anxiety disorder[30], eating disorders[92] and, most recently, adolescents with depression[93]. The studies show that improvements in knowledge occur following ICBT. More research is needed in this domain, for example, to test if knowledge acquisition can be influenced directly in treatment (by using methods from educational science).

Another recent and related body of work indicates that client's use of CBT skills may predict change in symptoms and satisfaction with life[94]. This promising direction of work indicates that practice of such skills may be an important mechanism of change, but requires large scale replication.

In sum, while there are observational studies on mechanisms of change in ICBT, there are few consistent findings regarding both moderators and mediators. Theory-driven and experimental research with repeated measure of process variables might help to identify what to look for, as much research has been informed by traditional psychotherapy research rather than the unique aspects of ICBT.

IMPLEMENTATION

ICBT and Internet interventions at large have been around for about 20 years[3], but implementation efforts have had mixed success. Moreover, these efforts have rarely been well documented from an implementation science perspective.

However, several effectiveness studies, with data from routine clinical practice settings, have been published for a number of disorders and conditions[95]. One early application in general health care was the tinnitus clinic in Uppsala, Sweden, which began delivering CBT for tinnitus via the Internet by the end of 1999, and published effectiveness data early on[96]. Another early example was the Interapy program from the Netherlands, which started in the 1990s and subsequently published effectiveness data on adult patients with symptoms of depression, panic disorder, PTSD or burnout[97]. The publicly available Moodgym from Australia is another early example with published data from community users[98].

Two contemporary examples of effectiveness reports come from the MindSpot Clinic in Australia[19] and the Internet psychiatry unit in Sweden[46,99]. Both groups have published data from their routine clinical practice, indicating that ICBT works when delivered as a regular intervention with ordinary clients. A recent study described the implementation of ICBT in five countries: Australia, Canada, Norway, Sweden and Denmark[100]. The authors also included references to published effectiveness studies of outcomes from their clinics, which all demonstrated large clinical improvement, low rates of deterioration, and high levels of patient satisfaction.

While still being at an early stage, published data clearly suggest that ICBT can work in regular settings, even as a stepped-care approach[101]. However, in most cases, the implementation has been handled by specialist and centralized clinics as opposed to wide-scale dissemination across a whole country with several clinics involved.

One potential obstacle when implementing Internet interventions and ICBT is negative attitudes among clients, clinicians and other stakeholders (such as insurance companies). One stakeholder survey was conducted in eight European countries with 175 organizations participating[102]. Results showed greater acceptability of blended treatment (the integration of face-to-face and Internet sessions within the same treatment protocol) compared to stand-alone Internet treatments. For example, for mild depression, 46.5% would recommend ICBT only and 69.8% blended treatment, but for moderate depression the corresponding figures were 15.7% and 57.2%, a marked difference. The same discrepancy was found for severe depression, with 1.9% recommending ICBT and 27% blended treatments. Thus, stakeholders are still hesitant to recommend ICBT as a stand-alone intervention, in particular for more severe depression. Another example is a study from the US conducted in a primary care setting, which showed that patients were less interested in taking part in ICBT than face-to-face treatment[103].

This literature should be interpreted with some caution, as there are likely differences both between and within countries

and settings. Given the observation that clinicians may not know what ICBT is, there is also a role for education in order to facilitate dissemination[104]. Nevertheless, the benefit of Internet interventions is likely to be that they provide an opportunity to care for people who cannot or do not want to access face-to-face care, rather than for people presenting for and wanting face-to-face care.

FUTURE DIRECTIONS

It is hard to predict how technology will develop, and also if new technology will be adapted for clinical use. One example is the use of sensors to measure physiological activity and behaviours such as sleep through smartphones[8]. Such technology already exists, but there is a need to investigate if it can advance treatment in any way. Another example is serious gaming and other delivery formats than just text and pictures[105]. Virtual reality is another technique that has become less expensive and can be integrated with ICBT[106]. Finally, in light of the ability to generate large amounts of data, the role of machine learning can possibly increase, with one initial study suggesting that prediction of treatment outcome may benefit from this approach[107].

A second possible future direction of research is to expand the reach of ICBT to other languages and cultures than are usually targeted in psychotherapy research (for example, immigrants). As an example of this, controlled studies have been conducted in the Arabic language[108] as well as in Chinese[109]. One project aimed at disseminating treatment across languages and cultures involved translation of a Swedish ICBT program for social anxiety disorder into Romanian[110].

A third development, already mentioned earlier, is the development and testing of Internet-delivered psychotherapies other than CBT. Examples include psychodynamic therapy[21], interpersonal therapy[111], and treatment programs involving attention training[112]. This is likely to increase, along with the possible integration of therapeutic techniques. We also expect more research into models of blended care, as described earlier.

A fourth development has to do with research designs and publication bias. With regards to research designs, we believe that the standard treatment versus control design may be less needed as compared to more sophisticated factorial designs testing several research questions simultaneously[51]. Publication bias is a problem in both basic and applied research, but we believe that change will happen. "Failed" trials of ICBT are already being reported[113], as well as trials with negative findings[25].

A fifth likely development is the creation of regulations and standards governing the delivery of ICBT in routine care. We recognize that health services delivered via the Internet should meet the same safety and quality standards as traditional models, but must also meet appropriate standards for the safety and security of sensitive health-related data. As a consequence of increasing interest in ICBT by health funders and regulators, we expect considerable future debate about how best to regulate such services, what standards they should meet, and how they should be accredited[114,115].

CONCLUSIONS

ICBT and other forms of Internet interventions hold promise as a way to increase access to evidence-based psychological treatment. They can also serve as vehicles for innovation, which may subsequently inform face-to-face treatments.

Even if ICBT is gradually being implemented, the process is slow and needs to be better documented. While the intervention has proved to be cost-effective[116], there are several professional challenges when moving from traditional service models. Most likely, blended approaches, which retain advantages from both face-to-face and technology-driven methods, will gain more popularity in the future.

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