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INTERNET INTERVENTIONS FOR DEPRESSIVE DISORDERS: AN OVERVIEW

Pim Cuijpers[1,2] and Heleen Riper[1,2,3]

[1] Department of Clinical Psychology, VU University Amsterdam, The Netherlands
[2] EMGO Institute for Health and Care Research, VU University and VU University Medical Center Amsterdam, The Netherlands
[3] Faculty of Health Sciences, University of Southern Denmark, Odense, Denmark

Abstract: Research on psychotherapeutic internet interventions started in the late 1990s and since then a considerable number of trials have shown that these interventions are effective in the treatment of depression. There is also no reason to assume that they are less effective than face-to-face treatments. This knowledge can be applied in most major areas of mental health care, including preventive services, primary care, specialized mental health care, and general medical care. Internet services can also be organised outside regular mental health care services because no personal contact with patients is needed. Internet interventions can build directly on the many new technological applications of the internet and mobile technology, through ecological momentary assessment and intervention, serious gaming, avatars and automatic emotion recognition, as well as smartwatches. This overview has made it clear that research in this area is booming and that there are many possibilities for all kinds of innovative interventions and applications.

Keywords: Depression; depressive disorders; Internet-based interventions; guided self-help; review.

Intervenciones basadas en internet para los trastornos depresivos: Una visión general

Resumen: A finales de los 90 comienzan las investigaciones sobre intervenciones psicoterapéuticas basadas en internet. Desde entonces gran cantidad de estudios han demostrado que son eficaces para tratar la depresión. No hay razón para suponer que son menos efectivos que los tratamientos tradicionales. Esto puede aplicarse en la mayoría de las áreas de atención para la salud mental, incluyendo servicios de prevención, atención primaria, atención especializada para la salud mental y atención médica general. Los servicios por Internet también pueden emplearse para la atención en salud mental, sin necesitar el contacto personal paciente-terapeuta. Además, pueden suponer nuevas aplicaciones tecnológicas aplicadas por internet y tecnología móvil, a través de la evaluación y la intervención ecológica momentánea, juegos serios, avatares y el reconocimiento automático de las emociones, así como smartwatches. Esta revisión constata el auge de la investigación en esta área y las muchas posibilidades para las intervenciones y aplicaciones innovadoras.

Palabras clave: Depresión; trastornos depresivos; Intervenciones basadas en Internet; auto-ayuda guiada; revisión.

INTRODUCTION

Psychological treatments are one of the important tools in the treatment of common mental disorders, like depression and anxiety disorders. About 75% of patients in high-income countries prefer these psychological interventions above pharmacological treatments (McHugh, Whitton, Peckham, Welge, & Otto, 2013). Individual therapies have long been considered to be the dominant delivery model and clinical practice, training, accreditation and research have been focusing mainly on this model in the past decades (Kazdin & Rabbitt, 2013). However, these treatments have not been scaled up to the extent that they may sufficiently help to reduce the disease burden of mental disorders

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Correspondence: Pim Cuijpers, Ph.D., Professor of Clinical Psychology, VU University Amsterdam, Van der Boechorststraat 1, 1081 BT Amsterdam, The Netherlands. E-mail: p.cuijpers@vu.nl

(Kazdin & Blase, 2011). Less than half of the people experiencing mental disorders receive treatment, and this is much lower in adolescents, older adults, people with lower socio-economic status, and people from ethnic minorities (Emmelkamp, David, Beckers, Muris, Cuijpers, Lutz, et al, 2014).

Since the late 1990s an increasing number of studies have focused on delivery of psychological treatments through the internet. Many of studies built on the tradition of guided CBT self-help treatments for depressive disorders that have been developed and examined in randomized trials since the 1980s (Schmidt & Miller, 1983; Brown & Lewinsohn, 1984). Internet-based and guided self-help treatments for common mental disorders have several advantages over traditional individual face-to-face treatments. They are cheaper, they save travelling time, reduce waiting lists, and patients can work on these treatment at the time they want, they may reduce stigma, and stimulate self-management. There are, however, also dangers and possible disadvantages. These interventions have not yet been examined sufficiently in clinical samples, have not yet been compared with other treatments such as pharmacotherapy, it is not clear which patients may benefit from these interventions and which will not, and it is difficult to make a diagnosis when the patient is not seen by a clinician.

One important question, however, is whether Internet-based interventions are effective in the treatment of depression and if they are as effective as face-to-face treatments. If face-to-face therapies are more effective than these treatments should be the first choice in selecting a treatment. If they are equally effective, however, or if internet-based treatments are more effective than face-to-face therapy, then we can start thinking of how we can apply these interventions in routine practice and how they can be used to increase the number of patients receiving an evidence-based treatment and reduce the disease burden of depression.

In the current article, we will first explore whether internet-based treatments are effective. Then we will examine how this knowledge can be applied in routine practice. Finally we will give a brief overview of recent technological developments that may change the current field of Internet interventions.

Are internet-based treatments effective in the treatment of depression?

A considerable number of randomized controlled trials has compared internet-based guided self-help for depressive disorders with (care-as-usual and waiting list) control groups. In a meta-analysis of studies in which only patients with a diagnosed depressive and anxiety disorders were included (Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010), it was found that these interventions have an effect size of $g = 0.78$ (95% CI: 0.59-0.96) compared with control conditions, which corresponds with a numbers-needed-to-be-treated (NNT) of two. In meta-analyses in which also patients who score high on a self-report depression measure are included, comparable effect sizes are found (Andersson & Cuijpers, 2009; Richards & Richardson, 2012).

These results correspond well with the effect sizes found for face-to-face psychotherapies for depression. For example, in a meta-analysis of cognitive behavior therapy for adult depression we found an effect size of $g = 0.71$ (95% CI: 0.62-079; Cuijpers, Berking, Andersson, Quigley, Kleiboer, & Dobson, 2013). In other meta-analyses we found comparable outcomes for other major psychotherapies for adult depression, including interpersonal psychotherapy ($g = 0.63$; 95% CI: 0.36-0.90; Cuijpers, Geraedts, van Oppen, Andersson, Markowitz, & van Straten, 2011) and behavioral activation treatment ($g = 0.74$; 95% CI: 0.56-0.91; Ekers, Webster, Van Straten, Cuijpers, Richards, & Gilbody, 2014).

Comparative studies of different psychotherapies in adult depression suggest that all major types of psychotherapy are equally effective or about equally effective. In a large network meta-analysis of almost 200 randomized trials no significant differences between major types of psychotherapy were found (Barth, Munder, Gerger, Nuesch, Trelle, Znoj, et al., 2013). This is in line with an earlier meta-analysis of studies directly comparing major types of psychotherapy for adult depression with each other (Cui-

jpers, van Straten, Andersson, & van Oppen, 2008). In this meta-analysis only small differences between different types of therapy were found, and these may very well be explained by differences between studies, participants and therapies.

So, if all therapies are equally effective or about equally effective, does this imply that the "Dodo Bird Verdict" is correct? This Verdict, referring to a passage in "Alice in Wonderland", suggests that all therapies are indeed equally effective, and it has been the subject of a debate that has been going on for several decades. Until now, it is not clear whether the Dodo Bird Verdict is correct. Although the meta-analyses suggest that there are no or only small differences between treatments, more subtle differences may have been missed because small sample sizes. Furthermore, comparable outcomes can not be seen as evidence that the effects are realized by the same mechanisms. It is also known from other psychotherapy research that there are clear differences between treatments, for example in psychological treatments of panic (Siev & Chambless, 2007), psychotic disorders (Turner, van der Gaag, Karyotaki, & Cuijpers, 2014) and eating disorders (Poulsen, Lunn, Daniel, Folke, Mathiesen, Katznelson, et al., 2014).

One interesting question that comes up when we conclude that all therapies are (about) equally effective, is how we can minimize treatments without reducing the effects. So, if all major therapies work, how far can we go in removing parts of the treatments while the effects are still comparable? This issue is important from a dissemination perspective, because the uptake of psychological treatments is still relatively low. Many people who could benefit from these treatments simply do not use these services. If we can simplify the treatments and deliver them in alternative formats, we could increase the uptake of psychological services and further reduce the disease burden of common mental disorders (Kazdin, & Blasé, 2011). One good example of this is the use of trained lay therapists in low- and middle income countries where not enough fully trained therapists are available (Patel, Weiss, Chowdhary, Naik, Pednekar, Chatterjee, et al., 2010).

Are internet-based and other guided self-help interventions as effective as face-to-face therapies?

The use of guided self-help and internet-based treatments is another important example of how treatments can be minimized without reduction of the effects. But are they really as effective as face-to-face therapies? The effect sizes found in meta-analyses depend on all kinds of characteristics of the participants, interventions and studies, and that they point at comparable outcomes can not be considered as strong evidence that they are indeed equally effective. A much better design to examine whether Internet-based therapies are as effective as face-to-face therapies is to compare them directly in one trial. In such trials patients are randomized to Internet-based therapy or face-to-face therapy. If no differences are found after treatment, it can be assumed that they are indeed equally effective.

In one meta-analysis we included 21 studies in which patients with depression or anxiety were randomized to guided self-help or face-to-face therapy (Cuijpers, Donker, van Straten, Li, & Andersson, 2010). Internet-based interventions were considered to be a specific type of guided self-help. Guided self-help can be defined as a psychological treatment in which the patient takes home a standardized psychological treatment protocol and works through it more or less independently (Cuijpers & Schuurman, 2007). This protocol involves a guide that describes the steps that the patient can take in order to apply a generally accepted psychological treatment to himself or herself. The standardized psychological treatment protocol can be written down in book form, but it also can be available through other media, such as a computer, television, video, or the Internet. Contacts with therapists are only supportive or facilitative in nature and are not aimed at developing a traditional relationship between therapist and patient. Instead, any contact is aimed at providing support and, if necessary, added explanation for working through the standardized psychological treatment. Contacts with therapists can be provided through personal contact, by telephone, by e-mail, or by any other

available means of communication (Cuijpers & Schuurman, 2007).

The meta-analysis of 21 studies directly comparing guided self-help and face-to-face therapies resulted in a differential effect size of d=0.02, which was almost equal to zero and not significant. We also did not find a significant difference at 3, 6 and 12 months follow-up, nor did we find that the risk of dropping out from treatment was higher (or lower) in the guided self-help groups, compared with the face-to-face conditions (Cuijpers et al., 2010).

In a more recent meta-analysis only trials were included that compared Internet-based treatments with face-to-face therapies (so, no other guided self-help therapies were included; Andersson, Cuijpers, Carlbring, Riper, & Hedman, 2014). The 13 studies included were aimed at different types of problems, including depression, social anxiety disorder, panic disorder, but also other problems such as tinnitus, male sexual dysfunction, and body dissatisfaction. The overall difference was again virtually zero (d = -0.01) and not significant.

Internet-based therapies only for mild to moderate problems?

It is often assumed that internet-based interventions should only be used in mild to moderate problems and that face-to-face therapies are needed for more severe cases of depression. There are several studies, however, that indicate that this is not necessarily the case. In an "individual patient data" meta-analysis 16 trials comparing guided self-help for depression with a control group, a total of 2470 patients could be included (Bower, Kontopantelis, Sutton, Kendrick, Richards, Gilbody, et al., 2013). The results of this meta-analysis showed that guided self-help was more effective compared to control conditions in more severely depressed patients.

In another study it was found that internet-based therapy for depression was also effective in chronically depressed patients (Wiersma, Titov, Van Schaik, Van Oppen, Beekman, Cuijpers, et al., 2011). Primary care patients with depression participated in a randomized controlled trial in which Internet-based CBT was compared with a waiting list. More than 70% of the participants were chronically depressed and they improved as much as participants who were not chronically depressed.

In secondary analyses of a randomized trial of internet-based CBT for depression in primary care patients compared to usual care, it was found that suicidal ideation was common (54%) (Watts, Newby, Mewton, & Andrews, 2012). It was also found that suicidal ideation dropped to 30% post-treatment despite minimal clinician contact and the absence of an intervention that was focused on suicidal ideation (it was focused on depression).

So, although it is often assumed that internet-based interventions are only useful in mild to moderate disorders, there is sufficient evidence that this is too simple and that these interventions may be useful as well in more severe disorders.

Guided or unguided Internet-based interventions?

Meta-analyses suggest that internet-based interventions with some kind of professional support are effective in the treatment of depression and that these effects are comparable to those of face-to-face therapies (Spek et al., 2007; Andersson & Cuijpers, 2009; Andrews et al., 2010; Richards & Richardson 2012). When no professional support is available, so when the patient has to work through the intervention without any personal support, these interventions are still effective, but the effects are significantly lower than guided interventions (Spek, Cuijpers, Nyklíček, Riper, Keyzer, & Pop, 2007; Andersson & Cuijpers, 2009). A meta-analysis of unguided Internet-based interventions for depression found an effect size of d = 0.28 (95% CI: 0.14-0.42) (Cuijpers, Donker, Johansson, Mohr, van Straten, & Andersson, 2011).

It is not clear which level of training the supporting professional should have, as very little research has focused on this question. In one study it was examined whether Internet-based treatment with support by a clinician or support by a technician were superior to a wai-

ting list (Titov, Andrews, Davies, McIntyre, Robinson, & Solley, 2010). It was found that both clinician- and technician-assisted treatment were superior to the waiting list and no clear difference between the two types of support were found, although the trial did not have sufficient power to examine non-inferiority of the technician-supported intervention.

In the Increasing Acces to Psychological Treatment (IAPT) program in the United Kingdom, psychological well-being practitioners deliver guided self-help treatments. They have been trained only to use guided self-help and are not fully trained psychotherapists or counselors (Clark, 2011). In other countries the comparable directions are taken, for example in many trials in the Netherlands, trained clinical psychology students deliver the treatments (Van Straten, Cuijpers, & Smits, 2008; Warmerdam, van Straten, Twisk, & Cuijpers, 2008).

A research agenda for Internet-based interventions

As indicated in the previous part of this paper, a considerable body of research has shown that internet-based guided self-help treatments are effective in the treatment of common mental disorders, and there is no reason to assume that these effects are smaller than those of traditional face-to-face treatments. One important part of a research agenda for Internet interventions is to examine how this knowledge can be used to improve mental health care. Several research groups in Europe, the US and Australia are working on this part of the research agenda (Riper, Andersson, Christensen, Cuijpers, Lange, Eysenbach, 2010).

One interesting area where this knowledge can be applied is in prevention. Prevention interventions usually have a low intensity and they can be assumed to be useful for high-risk groups and those with sub-threshold depression. The internet can also be used to identify those at risk more easily. Another interesting possibility of Internet interventions is that they can be applied outside current mental health care structures. Because these services can be organised without seeing patients in person, there is no need for physical contact, and they can therefore be organised on a national or even international level. Internet interventions can also be integrated in routine primary care and in specialized mental health care services. This can be done by delivering these interventions as guided self-help, but also in a "blended" format where parts of the treatment are delivered in person and other parts through the Internet (Kooistra, Wiersma, Ruwaard, van Oppen, Smit, Lokkerbol, et al., 2014). Relapse prevention and maintenance treatments can also be delivered successfully through the Internet (Holländare, Anthony, Randestad, Tillfors, Carlbring, Andersson, et al., 2013; Bockting, Kok, van der Kamp, Smit, van Valen, Schoevers, et al., 2011). A final area where Internet interventions may contribute to the further reduction of the disease burden of common mental disorders, is in low- and middle income countries (Watts & Andrews, 2014; Riper, Blankers, Hadiwijaya, Cunningham, Clarke, Wiers, et al., 2011). Self-guided Internet-based interventions may be somewhat less effective than guided self-help interventions, but when they are applied in settings without any infrastructure for mental health care, they can still contribute considerably to a reduction of the disease burden.

Technological innovations and Internet interventions

Research on how to apply the knowledge that internet interventions are as effective as face-to-face therapies is only one part of the research agenda for this area. Another major part of these innovations is related to the technological innovations in the Internet sector and the new possibilities this offers for applying these kinds of interventions. It is beyond the scope to give a comprehensive overview of the technological innovations related to the Internet, but we give a few important examples.

One important development is related to mobile internet and smartphones. These devices offer the possibility to measure mood and other components of mental health in real-time. This real-time assessments are called "ecological momentary assessment" or "experience sam-

pling" (Trull, & Ebner-Priemer, 2009; Wenze, & Miller, 2010). They offer new possibilities to measure important components of mental health and relate them to other events that are measured on the mobile phone (Warmerdam, Riper, Klein, van den Ven, Rocha, Henriques, et al., 2012). Smartphones typically have several sensors, such as the accelerometer, that can be used to measure movement (Guiry, van de Ven, Nelson, Warmerdam, Riper, 2014). But also other information from the smartphone, for example on the use of social media, can be used to develop personalised models for how mood develops over time and which events are associated with changes in mood. This allows the development of personalized advice and "ecological momentary interventions" which are based on the personal information of the user.

Virtual reality is another important development. A growing number of randomized trials show that interventions based on virtual reality have strong effects on common mental disorders (Opriş, Pintea, García-Palacios, Botella, Szamosközi, & David, 2012). They also offer possibilities to examine in more detail what exactly happens in patients during treatment. Because the technology to develop and use virtual reality is becoming easier and cheaper, new innovations can certainly be expected from this field.

There are several other fields that can be expected to change the field of Internet interventions. An important trial showed that "serious gaming" can have a significant impact on depression in adolescents (Merry, Stasiak, Shepherd, Frampton, Fleming, & Lucassen, 2012), and avatars, google glass and smartwatches will change how we use mobile applications.

We can conclude that Internet-interventions can build on the fast technological development in the field of the Internet and mobile devices. This will certainly have a large impact on this field and the field of mental health treatments worldwide.

Conclusions

Research on Internet and mobile interventions has come a long way since the first start in the late 1990s. In this article we saw that Internet-based guided self-help interventions are effective in the treatment of depression and that there is no reason to assume that it is less effective than face-to-face treatments of depression. Unguided Internet-interventions are less effective than guided interventions, but still have significant effects on levels of depressive symptoms. The knowledge that Internet-based guided self-help is as effective as face-to-face therapies can be applied in most major areas of mental health care, including preventive services, primary care, specialized mental health care, and general medical care. Internet services can also be organised outside regular mental health care services because no personal contact with patients is needed. Guided but also unguided interventions may play an important role in the delivery of mental health services in low- and middle income countries without an existing infrastructure for mental health care services. We also saw that Internet interventions can build directly on the many new technological applications of the internet and mobile technology, through ecological momentary assessment and intervention, serious gaming, avatars and automatic emotion recognition, and smartwatches.

This overview has made it clear that research in this area is booming and that there are many possibilities for all kinds of innovative interventions and applications. There should be no doubt that this research will have a large and lasting impact on the field mental health care and will change this field completely.

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