

Internet-based treatment of depression

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A considerable number of randomized controlled trials have shown that Internet-based interventions are effective in the treatment of depression. In the past years a large number of studies are currently focusing on how this knowledge can be used and implemented in mental health care, including preventive services, primary care, specialized mental health care, and general medical care. Furthermore, research on Internet interventions can directly incorporate many new technological applications of the Internet and mobile technology, serious gaming, avatars and automatic emotion recognition, and smartwatches. There is no doubt that this field of research will have a large and lasting impact on mental health care.

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Introduction

Major depressive disorders constitute a major challenge for health care in the upcoming decades [1]. Major depressive disorders (MDD) are currently ranked fourth worldwide in terms of disease burden, and are expected to rank first in disease burden in high-income countries by the year 2030 [2]. The loss of quality of life for patients and their relatives is substantial, and is worse than in chronic medical conditions such as hypertension, diabetes, and arthritis [3]. Furthermore, the economic costs associated with depressive disorders are huge [4], especially because of production losses, but also by direct and indirect medical costs.

Psychological treatments are considered to be one of the most important interventions to contribute to a reduction

of the disease burden of depressive disorders [5•]. Most patients in Western countries prefer psychological treatment above pharmacological treatments [6]. These treatments have been well developed in recent decades, and several evidence-based psychological treatments exist [7]. However, these treatments have not been scaled up to the extent that they may help reduce the disease burden of mental disorders [8•]. 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. Furthermore, the most dominant format in which psychotherapies are delivered is via individual face-to-face contact. This format is much more expensive and time-consuming than other formats, such as guided self-help, and Internet-based treatments. At the same time, most research shows that formats other than individual treatments can also be effective [9,10].

In this paper, we will first present evidence showing that Internet-based guided self-help therapies are effective in the treatment of depression, and the series of studies that have been conducted in recent years to examine how the knowledge that these interventions are effective can be implemented in mental health care. Then we will discuss some recent developments that move away from the ‘traditional’ Internet interventions, toward mobile health, avatars and serious gaming.

Internet-based interventions are effective in the treatment of depression

A considerable number of randomized controlled trials have shown that Internet-based guided self-help interventions are effective in the treatment of depression [11•]. In a meta-analysis of studies comparing Internet-based guided self-help with control groups an effect size of $d = 0.56$ (95% CI: 0.41–0.71) was found. In another meta-analysis only studies among patients with a major depressive disorders were included [12]. This resulted in 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.

These effects correspond well with the effect sizes found for face-to-face psychotherapies for depression [13], such as cognitive behavior therapy and interpersonal psychotherapy. For these treatments effect sizes ranging from 0.5 to 0.8 are found when compared with control groups. Direct comparisons between different types of treatments and treatment formats typically show that there are no major differences between types of therapy for depression or types of treatment format [7].

In a meta-analysis of 21 studies directly comparing face-to-face treatments with guided self-help therapies for depressive and anxiety disorders, no significant difference was found (differential effect size $d = 0.02$) [9]. 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 [13]. These studies focused on guided self-help through the Internet but also through more conventional methods, such as self-help books with telephone support. A more recent meta-analysis focused specifically on trials that compared Internet-based guided self-help treatments with face-to-face therapies (so, no other guided self-help therapies were included) [14^{••}]. The thirteen studies included in this meta-analysis were not only aimed at depression, but also at other problems such as social anxiety disorder, panic disorder, tinnitus, male sexual dysfunction, and body dissatisfaction. The overall difference of all studies was again virtually zero ($d = -0.01$) and not significant.

Guided Internet-based interventions can be considered as 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 [15]. This protocol describes the different steps the patient has to take for applying a generally accepted psychological treatment to himself or herself. The protocol can be presented in book form, or through other media, such as a television, video, computer, or the Internet. Contacts with therapists are not aimed at developing a traditional relationship between therapist and patient, and are only 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 [15].

Applying Internet-based guided self-help in mental health care

Most of the research on Internet-based guided self-help for depression has been conducted in randomized trials among self-referred depressed people from the community who were recruited by means of advertisements, leaflets and the Internet. But the knowledge that these interventions are effective in the treatment of depression could be implemented in routine mental health care in several ways. Several research groups in Europe, the US and Australia are working on this part of the research agenda [16].

One interesting area where this knowledge can be applied is prevention [13]. Prevention interventions typically have a low intensity nature in terms of access and program

intensity, which make Internet-interventions very well suited for this purpose. Several recent and ongoing trials are examining the possibilities of Internet-based interventions to prevent depression [17–20].

Other trials are aimed at examining if and how Internet interventions aimed at the treatment of depression can be integrated in routine primary care [21–23]. Internet-interventions can also be useful in specialized mental health care services, for example during the period between registration and the first contact with a therapist [24], in a ‘blended’ format where parts of the treatment are delivered in person and other parts through the Internet [25], or as relapse prevention and maintenance treatments [26,27].

A considerable number of trials has also focused on examining whether Internet interventions can be useful for depressed patients who also have a general medical disorder, such as cancer [28,29], diabetes [30,31], and heart disease [32,33]. The application of Internet-based interventions is also examined in areas outside health care, such as school [34], and in occupational settings [35,36].

Innovative applications in e-mental health: self-guided Internet interventions

In the previous paragraph, we saw that Internet-based guided self-help is effective in the treatment of depression that these effects are comparable to those of face-to-face treatments, and that many studies are now examining how this knowledge can be applied in mental and public health care. There are, however, also several new and innovative developments in the field of Internet-based interventions that currently have considerable interests among researchers.

One issue is the development of Internet interventions without any kind of human support. As indicated, Internet-based interventions with some kind of professional support have been found to be effective. When there is no support, however, and the patient has to work through the intervention all by himself or herself, the effects are significantly smaller than those of guided interventions [10,37]. In a meta-analysis of unguided Internet-based interventions for depression we found a small effect size of $d = 0.28$ (95% CI: 0.14–0.42) [38[•]]. If it would be possible to develop unguided interventions that are as effective as supported interventions, that would be much more efficient and less costly, allowing much broader implementation, because no infrastructure for delivery of the interventions, training and supervision of therapists would be needed. So, several trials continue to examine the effects of self-guided Internet interventions [39–41].

One could also argue that unguided Internet-interventions could be useful in low income and middle income

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