



Internet- and Mobile-Based Psychological Interventions: Applications, Efficacy, and Potential for Improving Mental Health

A Report of the EFPA E-Health Taskforce

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Abstract: The majority of mental health disorders remain untreated. Many limitations of traditional psychological interventions such as limited availability of evidence-based interventions and clinicians could potentially be overcome by providing Internet- and mobile-based psychological interventions (IMIs). This paper is a report of the Taskforce E-Health of the European Federation of Psychologists' Association and will provide an introduction to the subject, discusses areas of application, and reviews the current evidence regarding the efficacy of IMIs for the prevention and treatment of mental disorders. Meta-analyses based on randomized trials clearly indicate that therapist-guided stand-alone IMIs can result in meaningful benefits for a range of indications including, for example, depression, anxiety, insomnia, or posttraumatic stress disorders. The clinical significance of results of purely self-guided interventions is for many disorders less clear, especially with regard to effects under routine care conditions. Studies on the prevention of mental health disorders (MHD) are promising. Blended concepts, combining traditional face-to-face approaches with Internet- and mobile-based elements might have the potential of increasing the effects of psychological interventions on the one hand or to reduce costs of mental health treatments on the other hand. We also discuss mechanisms of change and the role of the therapist in such approaches, contraindications, potential limitations, and risk involved with IMIs, briefly review the status of the implementation into routine health care across Europe, and discuss confidentiality as well as ethical aspects that need to be taken into account, when implementing IMIs. Internet- and mobile-based psychological interventions have high potential for improving mental health and should be implemented more widely in routine care.

Keywords: ehealth, mhealth, prevention, treatment, treatment gap, Internet-based guided self-help, psychotherapy, mental health

Mental health disorders (MHD) are highly prevalent, with estimated lifetime and 12-month prevalence rates, ranging across countries between 18.1–36.1% and 9.8–19.1%, respectively (Kessler et al., 2009). MHD are one of the leading causes of disability (Whiteford et al., 2013) and

associated with an immense disease burden such as poorer quality of life of sufferers and their loved ones, an increased risk of developing chronic physical conditions and related mortality (Cuijpers & Smit, 2002; Saarni et al., 2007; Ustün, Ayuso-Mateos, Chatterji, Mathers, & Murray, 2004).

The economic burden of these disorders is enormous, including substantial economic costs, reduced workforce participation, occupational impairment, and lost productivity (Berto, D'Ilario, Ruffo, Di Virgilio, & Rizzo, 2000; Greenberg & Birnbaum, 2005; Smit et al., 2006).

In the past decades, a variety of interventions have been developed to treat mental health disorders for which efficacy has been demonstrated in a large number of randomized trials (Cuijpers, van Straten, Andersson, & van Oppen, 2008; Hofmann & Smits, 2008). However, in most countries, the majority of individuals suffering from a mental health disorder remain untreated (Mack et al., 2014; Wittchen et al., 2011). In fact, less than half of the individuals with a MHD are recognized and treated (Kohn, Saxena, Levav, & Saraceno, 2004) and treatment rates for children and adolescents are even more problematic (Essau, 2005; Zachrisson, Rödje, & Mykletun, 2006).

The reason for these seemingly low treatment rates does not appear to be due to structural supply shortfalls alone, such as long waiting times or the lack of available therapy within a close distance in rural areas. Recent studies suggest that a large number of afflicted simply do not take obtainable psychological and medical treatment into consideration, regardless of the availability (Andrade et al., 2014).

Many limitations of traditional psychotherapeutic interventions such as limited availability of evidence-based interventions and clinicians could potentially be overcome by providing Internet- and mobile-based psychological interventions (IMIs). This relatively new medium for preventing and treating mental health disorders introduces a fresh array of possibilities, including the provision of evidence-based psychological interventions that are free from the restraints of travel and time and which allow reaching participants for whom traditional opportunities who would not make use of mental health treatments otherwise. Depending on the concept, such approaches also allow to reduce costs of psychotherapy or on the other hand, increase the efficacy by, for example, increasing the treatment intensity using digital technologies or by helping patients to integrate therapeutic strategies into daily life between sessions.

IMIs can therefore be a major opportunity for the optimization of mental health treatment. At the same time, the implementation of IMIs poses new questions regarding effectiveness, safety, as well as patients and professional preferences.

The following article will provide an overview of the subject and narratively reviews the available evidence for the effectiveness of IMIs with regard to the prevention and treatment of MHD. Subsequently, we will discuss potential limitations and risk involved with IMIs, briefly review the status of the implementation into routine health care across Europe, and offer some suggestions regarding the direction of future research in this field.

Characterizing Internet- and Mobile-Based Interventions

There is a wide range of possibilities for using IMIs for the prevention and treatment of MHD, including mobile-based apps for the monitoring of health behavior, stand-alone self-help interventions, and supplemental elements integrated in conventional onsite psychological interventions (i.e., blended concepts). One common element of such interventions is that emotional, cognitive, and behavioral processes are modified and that their generalizations to users' daily lives are promoted using established psychotherapeutic techniques. IMIs can be categorized with regard to their use of technology, the extent of human support, the theoretical basis, and with respect to their areas of applications and indications.

Technical Implementation

For the implementation of IMIs, numerous technical means of delivery are possible. These include (1) the provision of evidence-based strategies as interactive self-help lessons; (2) virtual or augmented reality, for example, for exposure interventions (Garcia-Palacios, Hoffman, Carlin, Furness, & Botella, 2002); (3) serious-games, in which psychological strategies are trained in the context of a computer game (Merry et al., 2012); (4) avatar led sessions (An et al., 2013); (5) the use of automated memory, feedback, and reinforcement interventions, for example, through apps, emails, text messages, or short prompts, which support the participant in incorporating intervention content into everyday life; and (6) phone- and wearable-sensors, as well as apps for monitoring symptoms, or for monitoring and motivating health behavior such as homework completion or healthy behaviors, which can be used to support the therapeutic process (Lin, Ebert, Lehr, Berking, & Baumeister, 2013). Video, other telehealth services that mainly transfer the communication between the therapist and the patient to another medium, may also be classified as IMIs, due to their greater similarities to classical onsite interventions and in order to increase conciseness, they will not be further discussed in this overview.

Theoretical Basis

Historically the majority of evaluated IMIs were built on standard cognitive behavioral treatment (CBT) principles. Due to the possibility to deliver structured, standardized interventions with a strong focus on the training of strategies and specific behavior, IMIs are certainly suited for techniques that target changes in thoughts and behaviors. However, there is also some promising evidence for the

potential of other theoretical approaches, such as mindfulness-based methods, acceptance and commitment therapy, or psychodynamic treatments (Andersson, Paxling, Roch-Norlund, et al., 2012; Donker et al., 2013; Johansson, Hesser, Ljótsson, Frederick, & Andersson, 2012; Lin et al., 2015; Mak, Chan, Cheung, Lin, & Ngai, 2015). It is also the case that some CBT-oriented IMIs are also influenced by other theories in a more integrative framework (e.g., emotion-focused techniques or psychodynamic).

Human Support

As a basic principle, IMIs can be implemented with varying degrees of human support. The current most commonly used method is the so-called guided self-help, in which evidence-based content is usually provided as self-help material so that the participants can perform most tasks independently. An accompanying psychologist, other health professional or also lay health worker, then provides regular feedback or guidance on the tasks, most often once a week. Fostering adherence to the content of the intervention is often one major aim of human support in stand-alone IMIs, rather than the delivery of new therapeutic techniques that go beyond the content of the current lesson (Ebert et al., 2014; Schueller, Tomasino, & Mohr, 2016; Zarski et al., 2016). More specifically, this includes clarifying content and tasks, facilitating comprehension, providing feedback on solved problems and progress, and encouraging participants to continue to work on themselves. In order to reach these purposes, communication can happen either synchronously (per chat or video) or asynchronously (e.g., via email), the latter of which is more commonly used, and normally takes from a few minutes to a few hours (1–4 hrs) per participant and intervention. For the participant, the processing of self-help material, execution and repetition of exercises, as well as correspondence with a therapist can, however, be very intense and require a much greater time investment than that of the supporting therapist. The combination of self-help material with therapist guidance via technology thereby, in some degree, could increase empowerment of the patients, by removing some of the obstacles that may make it more difficult the face-to-face contact, and the degree of self-directed coping while maximizing the efficiency of the accompanying therapist. Irrespective of location, asynchronous contact and time-independent communication result in increased flexibility and autonomy for both participants and therapist.

Areas of Application

Applications of IMIs range from mental health promotion and mental disorder prevention to full treatment of mental

disorders, as well as interventions to reduce relapse or recurrence and the management of chronic conditions. IMIs are considered a promising approach for increasing the accessibility of evidence-based psychotherapeutic techniques to people on a larger scale due to their low threshold for accessibility, location and time independence, and anonymous usability (Buntrock et al., 2014). IMIs can be used either as a stand-alone approach, as part of a stepped-care approach or as an integrated element of a psychotherapeutic intervention consisting of online and conventional onsite face-to-face sessions (blended treatment).

As *stand-alone measures*, IMIs increase the reach of effective psychological interventions. Telehealth interventions (live therapy online) can transcend space. Stand-alone IMIs, however, can transcend both space and time. For example, the temporal and spatial independence of IMIs facilitates access to evidence-based interventions for individuals with limited mobility or those living in areas with limited access to psychotherapy. Individuals who are not able to attend appointments during usual visiting hours and, therefore, are not able to attend other onsite face-to-face options, would then also be able to participate in interventions in the evenings or on the weekend at their own pace. Such approaches could also help those people have difficulty expressing themselves or do not appreciate social or human contact (Lal & Adair, 2014). People who would have not sought to participate in a psychotherapeutic intervention due to other individual reasons, such as fear of stigma, could nevertheless still have access to IMIs. Despite increasing social acceptance of psychotherapy, everything which might be associated with mental problems produces for some individuals still a sense of shame, which in itself creates a barrier to the actual use of a psychological intervention (Henderson, Evans-Lacko, & Thornicroft, 2013). Using technologies may reduce the impact of shame on treatment utilization.

Figure 1 shows a typical example for such a stand-alone IMI. The Internet-based recovery training (GET.ON Recovery; detailed description in Thiart et al., 2013) consists of six sessions, focusing on (1) interconnection between sleep, psychological detachment, and the utilization of recreational activities and sleep hygiene; (2) stimulus control and sleep restriction; (3) boundary tactics, that is, practical behaviors that help to distinguish work and private life and thus foster psychological detachment; (4) psychoeducation on work-related rumination and worrying, their effects on sleep, and strategies to overcome such perseverative cognitions; (5) metacognitive techniques such as detached mindfulness and attention training in order to cope with perseverative cognitions; (6) future plans, in which participants reflect on strategies that they tried that were helpful and which they want to continue to apply in future daily routines. Each session can be completed in approximately 45–60 min. Sessions are interconnected, meaning that once

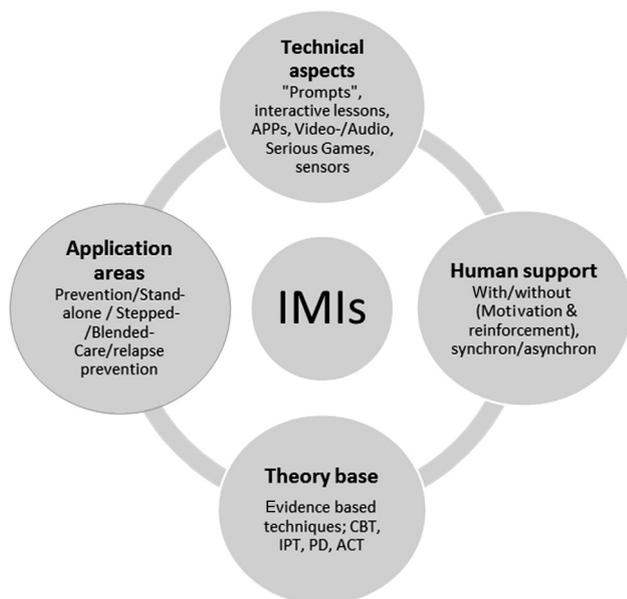


Figure 1. Central aspects of Internet- and mobile-based interventions.

a specific technique is introduced, participants are continuously asked to review their progress with the application of the techniques and set specific goals for the next week. Sessions consist of articles, exercises, and testimonials, and include interactive elements such as audio and video clips. The training is adaptive as the content is tailored to the specific needs of the individual participant by continuously asking participants to choose among various response options. Subsequent content is then modified depending on the participant's response. Participants are encouraged to keep a daily online recovery diary including items on total sleep time, time in bed, work-related rumination in the evenings, and frequency of recreational activities (Figure 2).

So-called *blended concepts* combine face-to-face psychotherapy with IMIs, either with the face-to-face treatment being the primary delivery mode, with some elements of the treatment supported through digital interventions, for example, when traditional psychotherapy is supported with smartphone-based exercise to facilitate the completion of homework; or the major part of the treatment is delivered through an IMI, and the face-to-face elements serve only as a supportive element, for example, in order to increase adherence to the online treatment modules.

In general, in blended concepts IMI elements can either replace certain aspects of the psychological treatment by, for example, taking over areas that do not necessarily require mediation by a psychotherapist, allowing more time during the sessions for face-to-face psychological process work. Such a concept may reduce the overall costs of a treatment. Psychotherapists could, for example, delegate time-consuming routine aspects of the intervention, such

as the delivery of psychoeducation to digital tools. On the other hand, face-to-face psychological treatments may also be augmented with digital elements, in order to improve the outcome of face-to-face interventions by, for example, providing exercises for the participant to work on in between the intervention sessions, thereby increasing clinical intensity. Another way in which IMIs could be used to improve the outcome of face-to-face interventions is by supporting the integration of behavior changes or training of techniques into routine life, thus extending the reach of the psychological intervention into the daily lives of participants. This can be achieved through methods, such as smartphone-based behavioral diaries, sending of messages with ultra-short prompts aimed at training specific strategies in daily life, or smartphone-based coaches which lead patients through potential anxiety-provoking or other difficult situations. Just-in-time, ecological momentary interventions using intelligent predictive algorithms based on smartphone-based user and sensor data, such as movement, interaction frequencies, and voice analytics allow to predict symptom change and help patients to cope with symptoms in the moment or manage at risk situations (Luxton, 2016; Van Daele & Vanhooymissen, 2015). Furthermore, the objective of most psychological interventions is that participants actively try to integrate new behavior into their daily life and maintain these changes in the long term. IMIs emphasize the active role of the person concerned in this process, thus promoting a sense of empowerment through encouraging them to use their own resources to solve problems.

Blended concepts allow, for example, to provide psychological interventions in primary health care such as the general practitioner (GP) setting and to foster systematic multi-professional care of patients in primary care by, for example, that psychologists support patients and GPs to deliver IMIs in primary health care. Another promising application might be the delivery of psychological IMIs in chronic somatic care (Ebert, Nobis, et al., 2016; Nobis et al., 2015; Sander et al., 2017; van Bastelaar, Pouwer, Cuijpers, Riper, & Snoek, 2011; van Bastelaar et al., 2012).

Within *stepped and matched-care approaches*, the degree of support participants receive are stepped up based on previous treatment intervention effects. For example, in depression unguided or guided self-help approaches can be offered as a first step, for example, to individuals in the prodromal disease stage (indicated prevention) in order to prevent the transition to the full blown disorder (Buntrock et al., 2016; Ebert, Buntrock, & Cuijpers, 2016) or also in full syndromal cases as a first step in the chain of treatment. Further intensive therapeutic support, such as outpatient psychotherapy, then could be provided to patients not responding to the IMIs. Similarly, step-down interventions supplement more intensive therapeutic measures with lower intensity support. For example, IMI-relapse prevention and

Content of the Training “GET.ON Recovery”

	1 My good start	<ul style="list-style-type: none"> • Psycho-education on recovery, sleep diary, sleep hygiene rules • Personal motivation and activation of recreational activities
	2 Better sleep	<ul style="list-style-type: none"> • Move on with sleep hygiene • Start sleep restriction
	3 Better detachment from work	<ul style="list-style-type: none"> • Develop skills that help separate work and private life • Gratitude journal promoting cognitive detachment in the late evening
	4+5 Worrying and rumination	<ul style="list-style-type: none"> • Techniques from CBT and metacognitive therapy, e.g. worry time, worry journal, attention training (ATT)
	6 My good future	<ul style="list-style-type: none"> • Personal summary of each of the 5 preceding modules • What exercises do I want to keep on doing in daily life? Why?

Figure 2. Example for session overview in an Internet-based stand-alone intervention (GET.ON Recovery).

chronic care concepts could be offered to patients following an acute treatment in order to stabilize acute treatment effects and thereby prevent relapse and recurrence (Bockting et al., 2011; Ebert, Gollwitzer, et al., 2013; Ebert, Tarnowski, Gollwitzer, Sieland, & Berking, 2013; Golkaramnay, Bauer, Haug, Wolf, & Kordy, 2007; Kok, Bockting, Burger, Smit, & Riper, 2014).

Effectiveness

In the following section, we will narratively review the evidence for the effectiveness of with regard to the treatment of mental health disorders based on meta-analyses of (a) randomized controlled trials that (b) evaluated Internet- or mobile-based interventions (c) on mental health disorder symptoms (d) in samples of adults, children, or adolescents. Most studies were identified through knowledge of the authors of the field. Additionally, searches were conducted in the Cochrane Central Register of Controlled trials (CENTRAL) and Pubmed up to August 2016. Terms indicative of “Internet- and mobile-based interventions,” and “mental health disorders” and “meta-analysis” were used to search these databases, with the search being limited to “humans,” English, and peer-reviewed journals and meta-analyses. We also reviewed the reference lists from all identified publications. However, the overview is not meant to be exhaustive.

IMIs Compared to Untreated Control Groups

There are currently well over 100 randomized clinical studies, which clearly indicate the huge potential of this approach for the prevention and treatment of mental and behavioral disorders. Especially well researched are stand-alone interventions, most of which are based on the concept of guided self-help.

The most well-established and frequently researched IMIs are programs for anxiety disorders and depression. In comparison to nontreated control groups, high efficacy has been documented in a large amount of studies (Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010; Ebert, Zarski, et al., 2015; Mayo-Wilson & Montgomery, 2013; Richards & Richardson, 2012; Richards, Richardson, Timulak, & McElvaney, 2015). In one meta-analysis, IMIs based on 22 randomized controlled trials (RCTs) used for depression and anxiety disorders showed a standardized average effect size of 0.88 (Andrews et al., 2010). For example, a recent meta-analysis revealed a statistically significant pooled effect of Hedges’ $g = -0.90$ (95% CI $[-1.07, -0.73]$, $p < .001$) favoring IMIs compared to no-treatment controls in the treatment of Major Depressive Disorder. A recent Cochrane review found large intergroup effect sizes of 1.06 (95% CI $[0.82, 1.29]$, $p < .001$) compared to waiting list controls. Meta-analytic evidence is also available for other mental disorders, such as posttraumatic stress disorder, sleep disorders, eating disorders, pain disorders, or substance abuse

Table 1. Efficacy of IMIs based on meta-analyses of randomized trials

Target population	SMD	[95% CI]	k	N	I ²	NNT
Adults						
Major Depression (Königbauer et al., 2017)	0.90	[0.73, 1.07]	19	727	0.00	2.10
Panic Disorders (Olthuis et al., 2015)	1.52	[0.48, 2.56]	6	323	93.00	2.26
Social Phobias (Olthuis et al., 2015)	1.38	[1.13, 1.63]	8	661	48.00	1.49
General Anxiety Disorders (Olthuis et al., 2015)	0.80	[0.42, 1.19]	6	394	69.00	2.34
PTSD (Kuester et al., 2016)	0.95	[0.56, 1.43]	8	936	91.26	2.01
Insomnia (Zachariae et al., 2015)	1.09	[0.74, 1.45]	8	1,071	82.80	1.79
Hazardous Alcohol Use (Riper et al., 2014)	0.20	[0.13, 0.27]	16	5,612	27.00	8.93
OCD (own calculations) ¹	0.90	[0.66, 1.19]	3	122	0.00	2.10
Eating Disorders (Melioli et al., 2016)	0.31 ²	[0.21, 0.42]	16	1,643	0.00	5.95
Chronic Pain (Buhrman, Gordh, & Andersson, 2016)]	0.42	[0.28, 0.55]	15	2,213	53.50	4.27
Physical Activity (Davies et al., 2012)	0.14–0.37	[0.09, 0.61]	34	9,638	73.75 (Q)	12.82–4.85
Irritable Bowel Syndrome (own calculations) ³	0.74	[0.37, 1.11]	4	353	58.14	2.50
	MD	[95% CI]	k	N	I ²	NNT
Weight [mobile only] (Mateo, Granado-Font, Ferré-Grau, & Montaña-Carreras, 2015)	1.04 kg	[1.75, 0.03]	12	913	41.00	1.86
	RR	[95% CI]	k	N	I ²	
Smoking (Myung, McDonnell, Kazinets, Seo, & Moskowitz, 2009)	1.40	[1.13, 1.72]	9	12,543	62.70	
Children & Adolescents						
	SMD	[95% CI]	k	N	I ²	NNT
Depression (Ebert, Zarski, et al., 2015)	0.76	[0.41, 1.12]	4	796	61.42	2.44
Anxiety (Ebert, Zarski, et al., 2015)	0.68	[0.45, 0.92]	7	796	0.00	2.70

Notes. ¹Own calculations (Hedges' *g* using Comprehensive Meta-Analyses 2.0) based on primary study results of E. Andersson et al. (2012), Herbst et al. (2014), and Lenhard et al. (2017). ²Purging. ³Own calculation of between group effect sizes, based on studies reported in (Hedman et al., 2012). SMD = standardized mean difference (Cohen's *d*/Hedges' *g*); CI = confidence interval; MD = mean difference; RR = relative risk; *k* = number of primary randomized trials; *N* = number of participants in primary studies included in the meta-analysis; NNT = numbers needed to be treated in order to achieve one treatment response; PTSD = posttraumatic stress disorder.

(Hedman, Ljótsson, & Lindfors, 2012; Kuester, Niemeyer, & Knaevelsrud, 2016; Macea, Gajos, Daglia Calil, & Fregni, 2010; Riper et al., 2014; Zachariae, Lyby, Ritterband, & O'Toole, 2015) – Table 1 gives an overview of the effectiveness of IMIs for different mental health disorders based on meta-analytical findings. However, the reported meta-analyses also indicate substantial heterogeneity between studies for some of the disorders, which indicates that not all IMIs result in similar effects and future studies are certainly needed to better understand the influence of certain IMI and patient characteristics that determine the effectiveness of such approaches.

There is also promising evidence for other mental health disorders based individual RCT, including, for example, for obsessive-compulsive (E. Andersson et al., 2012; Herbst et al., 2014; Lenhard et al., 2017; Storch et al., 2011), psychotic (Gottlieb, Romeo, Penn, Mueser, & Chiko, 2013; Harper, 2013), body dysmorphic disorders (Enander et al., 2016) or bipolar disorders (Hidalgo-Mazzei et al., 2015), male and female sexual dysfunction (E. Andersson et al., 2011; Jones & McCabe, 2011; Schover et al., 2012; van Lankveld, Leusink, van Diest, Gijs, & Slob, 2009; Zarski, Berking, Fackiner, Rosenau, & Ebert, 2017), tinnitus (Abbott et al., 2009; Andersson, Cuijpers, Carlbring, Riper, &

Hedman, 2014; Andersson, Strömberg, Ström, & Lyttkens, 2002; Hesser et al., 2012; Hesser, Westin, & Andersson, 2014; Jasper et al., 2014a; Kaldø et al., 2008; Nyenhuis, Zastrutzki, Jäger, & Kröner-Herwig, 2013; Nyenhuis, Zastrutzki, Weise, Jäger, & Kröner-Herwig, 2013; Weise, Kleinstäuber, & Andersson, 2016), complicated grief (Wagner, Knaevelsrud, & Maercker, 2006; Wagner & Maercker, 2007), pathologic gambling (Carlbring & Smit, 2008; Luquiens et al., 2016) and fatigue (Nijhof et al., 2012, 2013), and self-harming thoughts and suicidal behaviors (Franklin et al., 2016).

Most of the interventions evaluated up to this point were aimed at adults as a target group. However, in recent years, the number of studies which investigate possible potential for the treatment of mental disorders in children and adolescents has increased. In one such meta-analysis based on 14 RCTs, Ebert and colleagues discovered significant medium to large effect sizes for IMIs in the treatment of children and adolescents, for interventions targeting anxiety ($g = 0.68$; 95% CI [0.45, 0.92]; $p < .001$; NNT = 2.70); for interventions targeting depression ($g = 0.76$; 95% CI [0.41, 0.12]; $p < .001$; NNT = 2.44) as well as for transdiagnostic interventions ($g = 0.94$; 95% CI [0.23, 2.66]; $p < .001$; NNT = 2.60) compared to no-treatment

controls in the treatment of children and adolescents (Ebert, Zarski, et al., 2015).

One important limitation of many of the above cited studies is that, also due to ethical reasons, IMIs were compared to waitlist controls to assess effects of the training. Treatment and change expectancies have been discussed to cause participants with delayed access to treatment in psychotherapy trials to be less motivated to initiate health-related behavior changes or to initiate other treatment and thus may overestimate effects for what can be expected as incremental effect compared to no treatment in routine care (Mohr et al., 2014).

IMIs Compared to Face-to-Face Treatments

The great potential of IMIs is not solely based on studies in which these approaches were evaluated in comparison to (mostly) untreated control groups, but rather also in direct comparison to face-to-face therapy. In a meta-analysis based on 13 RCTs in various disorders (depression, social phobias, tinnitus, panic disorders, sexual dysfunction, specific phobias, among others), Andersson and colleagues found on average no differences in the mean effect size between face-to-face psychotherapy and IMIs which were designed as a therapist-assisted CBT-based stand-alone intervention ($g = -0.01$; 95% CI $[-0.13, 0.12]$; Andersson et al., 2014). The results were confirmed on a disorder-specific level in a recent Cochrane review for the treatment of anxiety disorders in adults ($g = 0.06$; 95% CI $[-0.37, 0.25]$, in the direction of favoring face-to-face; Olthuis, Watt, Bailey, Hayden, & Stewart, 2015) and a meta-analysis by Andersson for the treatment of depression ($g = 0.12$, 95% CI $[-0.06, 0.30]$; in the direction of favoring guided IMIs; Andersson, Topooco, Havik, & Nordgreen, 2016). Even if the current number of RCTs that evaluated IMIs in direct comparison to classical onsite psychotherapy is limited, the results so far suggest that both types of intervention may achieve equivalent treatment success. However, it must be mentioned that this applies only to patients who are potentially willing to participate in both face-to-face and Internet-based treatment. Such treatments with a major focus on self-help are not necessarily adequate treatment option for all affected people (Apolinário-Hagen, Vehreschild, & Alkoudmani, 2017; Baumeister, Nowoczin, et al., 2014; Ebert, Berking, Cuijpers, et al., 2015), and face-to-face psychotherapy is likewise not necessarily an attractive form of intervention for all (Andrade et al., 2014).

Significantly less evidence exists regarding the benefits of IMIs as interventions in combination with face-to-face psychotherapy (blended) in comparison to the body of

evidence supporting stand-alone interventions. However, although the number of studies aiming to increase the effectiveness of face-to-face interventions using a blended approach is still limited, there are at least four studies indicating that this might be possible (Campbell et al., 2014; Carroll, Ball, Martino, & Nich, 2008; Cochran et al., 2015; Sethi, Campbell, & Ellis, 2010). Sethi and colleagues showed, for example, in the treatment of depression and anxiety in youth, that Blended Face-to-Face and Internet-CBT was superior to both, Face-to-Face CBT and Internet-CBT alone. Moreover, that it might be indeed possible to increase the effectiveness of psychological interventions by using a blended approach is also supported by a recent meta-analysis by Lindhiem, Bennett, Rosen, and Silk (2015). On the basis of 10 RCTs, they found that, in direct comparison to strictly onsite interventions, psychological interventions were considerably more effective for a range of conditions when behavior changes between face-to-face sessions were supported by an additional mobile component such as SMS (SMD = 0.27, $p < .05$). However, research regarding the optimal integration of IMIs into onsite therapy and the use of such intervention to increase the effectiveness of psychotherapy is still in its infancy.

Also with regard to the potential of such approaches saving clinician's time, only few studies compared blended with non-blended concepts in randomized trials so far. A recent systematic review (Erbe, Eichert, Riper, & Ebert, 2017) identified three trials that showed that blended concepts were able to reduce clinicians' time by 50–86% without reducing the efficacy of the therapy (Kenwright, Liness, & Marks, 2001; Marks, Kenwright, McDonough, Whittaker, & Mataix-Cols, 2004). That such outcomes cannot be assumed to achieve simply by offering clinicians to use online treatment modules in order to delegate some of the aspects of face-to-face psychotherapy to the Internet, has been recently shown by a study of Kenter and colleagues (2015). In a naturalistic study, the authors compared costs and outcome of blended CBT under routine care conditions to historical data of routine face-to-face psychotherapy. They found that blended CBT resulted in similar outcomes as face-to-face psychotherapy, but was associated with a higher number of sessions, and more therapist time, as the online treatment modules were simply provided on top of the face-to-face treatments by therapists and as a consequence resulted in higher overall costs. This may indicate that, if the aim should be to reduce costs of psychotherapy, a clear and adequate implementation model is needed, making it more appealing for therapists to use less face-to-face sessions. Certainly, more research is needed regarding the optimal integration of IMIs in face-to-face psychological interventions, in order to reduce costs on the one hand and to improve outcome on the other hand. A number of

large-scale studies across Europe are currently on the way (Kleiboer et al., 2016; Kooistra et al., 2014; Romijn et al., 2015) which will provide valuable insight into the potential of blended concepts for the treatment of mental health disorders.

Effects of IMIs Under Routine Care Conditions

In addition to findings from randomized clinical trials, there is accumulating evidence for a number of disorders that [therapist-assisted] IMIs can result also in clinical relevant changes when implemented in routine clinical practice (Andrews & Williams, 2014; El Alaoui, Hedman, Kaldo, et al., 2015; El Alaoui, Hedman, Ljótsson, & Lindefors, 2015; Hedman et al., 2014; Nordgreen, Gjestad, Andersson, Carlbring, & Havik, 2017; Titov et al., 2015, 2016; Williams, O'Moore, Mason, & Andrews, 2014). However, the picture on pure self-guided intervention under routine care conditions is much less clear. Although clinical relevant effects have been found on the basis of randomized controlled trials for self-guided interventions, for example, for anxiety disorders (Olthuis et al., 2015) and also for depression (Karyotaki et al., 2017), one need to consider that this evidence is based on randomized clinical studies, which bring a per se rather high structuring of participants and a high research attention with it, that is highly unlikely to be found in routine clinical care. Since the securing of commitment represents an adherence-promoting element in self-help interventions, it is likely that the effect sizes for pure self-help intervention under laboratory conditions are significantly overestimated for their potential in routine care (Ebert & Baumeister, 2017). Such an assumption is supported by pragmatic studies in which no additional benefit of unaccompanied self-help programs compared to the standard treatment was found (Littlewood et al., 2015). However, in a subsequent trial, the same intervention delivered with the additional provision of telephone support showed, in addition to GP care, to be superior compared to the pure self-guided intervention (Brabyn et al., 2016). Although, based on the current available evidence, preference should be in routine clinical practice, whenever possible, given to self-help approaches with at least some form of adherence promoting and intervention process monitoring guidance, the use of pure self-help interventions might also offer valuable advantages. According to Muñoz et al. (2016) massive open online interventions may serve as a potential tool for the provision of evidence-based behavioral health interventions to worldwide populations at no cost to the users. Integrated in digital apothecaries (Muñoz, 2017) in which collections of evidence-based IMIs address promotion, prevention, treatment of behavioral and mental health

problems, such approaches may help to increase the access to evidence-based interventions, especially in countries with no, or only limited access to free mental and behavioral health care.

More research is clearly needed to determine the value of pure self-guided interventions for routine clinical care and on how to embed technology-assisted services optimally into routine mental health care (Mohr, Weingardt, Reddy, & Schueller, 2017). One large EU-funded project on the implementation of Internet-based CBT for depression in routine Care in 11 European countries may shed some light on this (Vis et al., 2015).

Prevention of Mental Health Disorders

Compared to the body of evidence for the treatment of mental health disorders, evidence for the effectiveness regarding the prevention of mental health disorder onset is still limited (Sander, Rausch, & Baumeister, 2016). In a recent systematic review, Ebert, Cuijpers, Muñoz, and Baumeister (2017) identified 10 randomized controlled trials that investigated the effect of an Internet-based intervention on the incidence of a mental health disorder, of which six found positive results with NNT in order to avoid one additional case ranging between 9.3 and 41.3. Since then a couple of more randomized controlled trials have been conducted pointing toward the general potential of such approaches for the field of prevention. For example, Taylor and colleagues found preventive effects of an Internet-based eating disorder prevention program in subgroups at very high risk of developing eating disorders (Taylor et al., 2016). Buntrock and colleagues found an Internet-based guided self-help intervention effective in reducing subthreshold symptoms of depression and reducing the risk for developing a depression within one year by 41% (Buntrock et al., 2015, 2016; Ebert, Buntrock, et al., 2016), at an acceptable cost-benefit ratio (Buntrock et al., 2017).

In summary, available evidence clearly indicates the high potential of IMIs for the prevention of MHD. Nevertheless, the number of randomized controlled trials that have been conducted to date is still very limited and so far it is not possible to draw definite conclusions about the potential of IMIs for the prevention of MHD on a disorder-specific level for most disorders and there is a need for more rigorously conducted large-scale randomized controlled trials. However, it is of note that there is quite substantial evidence for the effectiveness of health behavior change IMIs regarding the reduction of problematic alcohol consumption (Riper et al., 2014), improving sleep (Ebert, Berking, Thiart, et al., 2015; Thiart, Lehr, Ebert, Berking, & Riper, 2015; Zachariae et al., 2015), reducing work-related

stress (Ebert, Heber, et al., 2016; Ebert, Lehr, et al., 2016; Heber, Lehr, Ebert, Berking, & Riper, 2016; Lehr et al., 2016), all of which might be useful as MHD prevention IMIs as well.

Limitations and Possible Negative Effects

As with any other method, it is important to take into account the limitations and risks involved with IMIs alongside all of the potential benefits of the procedure. At this stage, however, no reliable empirical information is available on contraindications for IMIs, and more research is clearly needed to determine who is likely to profit from such an approach, who eventually not. It is often argued that in the context of stand-alone methods without therapeutic support, the ability to assess the risk and respond adequately to emergencies (such as suicide) is restricted since nonverbal cues are missing that help to assess whether dissociation of suicidal thoughts is possible. Therefore, acute suicidality is considered often as a criterion for exclusion in many cases. However, various current empirical studies show that IMIs can also be used effectively in the treatment of suicidal patients, in general, and can reduce suicidal tendencies considerably (Christensen et al., 2013; Mewton & Andrews, 2014). Although there are already many apps available for preventing suicidal behaviors in the app stores, these lack empirical support (Aguirre, McCoy, & Roan, 2013; Larsen, Nicholas, & Christensen, 2016). Overall more research is clearly needed to determine under what circumstances such approaches can also be safely used for patients with suicidal ideation.

Little more can be said about further possible negative effects of IMIs at this stage (Rozental et al., 2014). Potential risks and negative effects include, depending on the concept, the following points, among others:

- (1) limited ability to timely identify patients prone to self-injury;
- (2) imprecise diagnosis;
- (3) the development of a reduced health-related self-efficiency if participants are not successful with using a stand-alone IMI;
- (4) the development of negative attitudes toward psychological interventions in general in nonresponders or deteriorated cases;
- (5) an excessive demand or mental overload of those concerned in the autonomous administration of therapeutic methods;
- (6) the development of a technological and therapeutic dependency (e.g., a patient with agoraphobia feeling insecure to be in public spaces without the possibility

to rely on his or her iPhone for symptom control in case issues arise);

- (7) a possible worsening of symptoms in subgroups of patients; and,
- (8) the delivery of potential harmful techniques (e.g., encouraging risky behavior in a crisis).

Although initial studies address this subject (Boettcher, Rozental, Andersson, & Carlbring, 2014; Ebert, Donkin, et al., 2016; Rozental, Boettcher, Andersson, Schmidt, & Carlbring, 2015; Rozental, Magnusson, Boettcher, Andersson, & Carlbring, 2017) possible negative effects of such interventions cannot be ruled at present and there is an urgent need for further research.

With regard to a potential deterioration of symptoms in subgroups of patients a recent individual patient data meta-analysis of Ebert and colleagues (Ebert, Donkin, et al., 2016) showed the mean risk for a symptom deterioration was significantly lower in participants of Internet-based guided self-help for depression compared to controls. They found no subgroup of participants with an increased risk for deterioration, although education moderated effects on deterioration, with patients with low education displaying a higher risk for deterioration than patients with higher education, indicating that treatment and symptom progress of patients with low education should be closely monitored, as some patients might face an increased risk for symptom deterioration.

Mechanisms of Change

While in the first years of IMI research, studies were primarily concerned with the question if such interventions may be effective at all, current research is increasingly focusing on the mechanisms of change in IMIs. Yet, it can't be fully answered what makes IMIs work. One potential explanation why the Internet as a treatment modality might not be inferior to conventional onsite interventions could be the stronger emphasis on self-empowerment within IMIs, thus causing an amelioration of self-management competencies in their users.

Taking into account that virtually all IMIs implement evidence-based psychotherapeutical techniques into their rationale, one may suppose that key mechanisms of change underlying those contents (i.e., self-efficacy, change of dysfunctional attitudes, stress reactivity, emotion regulation) are equally active in IMIs. However, there is still insufficient evidence to confirm this hypothesis. Overall, one should stress that further research is needed to shed light on mechanisms of change in IMIs, that is, the interplay of variations in technological implementation, content, and design of IMIs and their resulting effects.

“Hello, here’s your SmartCoach. Today we will begin with exercises for the module “understanding emotions”. Quickly, close your eyes, and reflect: what emotions do you feel right now? Name those feelings and rate them on a 1-10 scale.”

Such exercises might be triggered by intelligent algorithm future, so that short waiting periods, such as waiting for a bus can be used for quick exercises and thus raise the chance for users implementing content into their daily life routine.

Figure 3. Example for automatized prompts with ultra-short exercises on the smartphone to train techniques in daily life.

Since the majority of scientifically developed IMIs for depression resort to evidence-based therapeutic techniques, it seems plausible to assume that the same specific and potentially also nonspecific factors of face-to-face psychotherapies come to play. In fact, a recent narrative review indicates that the same mediators are assumed in IMIs, for example, in the treatment of depression (Mogoșe, Cobeanu, David, Giosan, & Szentagotai, 2017). So far, factors such as cognitions (e.g., negative automatic thoughts, rumination, or dysfunctional attitudes), emotion regulation, expectancy, attributional style, coping strategies, perfectionism, therapeutic alliance, and treatment credibility have been examined (Boettcher, Renneberg, & Berger, 2013; Ebert, Berking, Thiart, et al., 2015; Ebert, Lehr, et al., 2016; Graham et al., 2015; Hedman et al., 2013; Hesser et al., 2014; Lévesque et al., 2017; Ljótsson et al., 2013; Mogoșe et al., 2017; Morgan, Mackinnon, & Jorm, 2013; Warmerdam, van Straten, Jongasma, Twisk, & Cuijpers, 2010).

However, the treatment format of IMIs provides two special features that distinguish them from traditional face-to-face therapies which ought to be part of such a model: technical applications and guidance.

Reminders and Reinforcement Mechanisms

One of the assets of IMIs compared to traditional psychotherapy includes the possibility to send automatic reminders, feedback, and reinforcement mechanisms (prompts) to foster the application and training of psychotherapeutic techniques in daily life. For example, ultra-short exercises reflecting content addressed in previous therapy sessions can be sent to a patient’s mobile phone via SMS (see Figure 3). Reminders can also boost the usage of IMIs, which may lead to higher treatment adherence. This way, prompts take over therapeutic tasks and promote patients’ self-reliance. At the same time, such applications are economic and easily implemented. Support for the assumption that such prompts are a relevant mechanism in IMIs comes, for example, from a meta-analytic review by Cowpertwait and Clarke (2013) in which subgroup analysis suggested that IMIs for depression with incorporated reminders showed

a larger pooled SMD ($g = 0.49$) than trials without reminders ($g = 0.24$).

Human Support

At this stage, technically delivered human support (“guidance”) is the most investigated potential mechanism in IMIs. Due to the technological possibilities mentioned above, the necessity of human contact and support has declined considerably. Nevertheless, meta-analytic findings suggest that stand-alone IMI with guidance tends to have greater effect sizes than IMIs without human support (Baumeister, Reichler, Munzinger, & Lin, 2014; Cowpertwait & Clarke, 2013; Heber et al., 2017; Lehr et al., 2016; Richards & Richardson, 2012): IMIs with human assistance showed smaller attrition rates, a higher number of completed modules ($g = .52$) and larger symptom reduction in users ($g = -.27$). Especially in depression, the degree of human support seems to be an influential factor, which could also be shown in a meta-analysis on this topic ($d = 0.36$ without and $d = 0.78$ with support; Richards & Richardson, 2012). However, a recent meta-analysis on IMIs for diagnosed MDD did also not find differences between guided and unguided treatments, although this might be due to limited power (Königbauer, Letsch, Doebler, Ebert, & Baumeister, 2017). Also a fairly recent Cochrane review, however, did not find significant differences between therapist-facilitated and pure self-help interventions in randomized controlled trials for the treatment of anxiety disorders (Olthuis et al., 2015), which hints at the point that the importance of human support might vary for different indications.

Although treatment effects have been found for unsupported self-help interventions, one has to concede that this evidence is based on experimental studies, which per se are highly structured and provide a minimum of human contact through recruitment and study administration, among other things, which is not found in such a way in routine care.

Concerning the dose-effect relation, evidence from reviews suggests that as degrees of support increase, so does the efficacy of IMIs. Nevertheless, it is still unclear at what threshold of therapeutic support invested in patients no additional benefits can be reached anymore.

On the basis of previous studies, Andersson and colleagues estimate that exceeding 100 min per participant in a 10-week IMI does not result in any enhancement of treatment effects (Andersson, Carlbring, Berger, Almlöv, & Cuijpers, 2009; Johansson & Andersson, 2012).

It furthermore remains unclear what dose of contact may be optimal at what stadium of treatment (i.e., linear doses of contact throughout the intervention, decreasing support over time, support on demand). Further research is certainly needed to determine whether the efficacy of IMIs varies depending on the quantity (dose-response relationship), quality of human support (e-coach qualification and content), communication medium (email, face-to-face, phone), and communication mode (asynchronous vs. synchronous) and whether these association vary by disorder and by other patient characteristics.

Despite the qualitative and quantitative reduction of overall therapeutic contact and the absence of social and nonverbal signals, studies clearly indicate that high-quality and even a comparable perceived quality of the therapeutic alliance can be achieved with IMIs just as in face-to-face settings (Andersson, Paxling, Wiwe, et al., 2012; Bengtsson, Nordin, & Carlbring, 2015; Cook & Doyle, 2002; Ebert, Hannig, et al., 2013; Knaevelsrud & Maercker, 2006; Preschl, Maercker, & Wagner, 2011). However, the importance of the therapeutic alliance for treatment outcome in IMIs is yet less clear. While some studies did not find a significant association between therapeutic alliance and outcome (Andersson, Paxling, Wiwe, et al., 2012; Knaevelsrud & Maercker, 2006; Preschl et al., 2011), others' did (Anderson et al., 2012; Knaevelsrud & Maercker, 2007; Nordgren, Carlbring, Linna, & Andersson, 2013; Wagner, Brand, Schulz, & Knaevelsrud, 2012), while a recent study found different aspects of the working alliance to predict gain scores in Internet- versus face-to-face treatment for chronic tinnitus (Jasper et al., 2014b). It is yet unclear, whether differences in findings are due to different characteristics in interventions, disorders or the way human guidance was delivered. Certainly more research is needed to better understand the role of in the working alliance in IMIs. The efficiency model of support might be a valuable framework for guiding researchers in such efforts (Schueller et al., 2016).

Professional, Confidentiality, and Ethical Aspects

Ethical Aspects

From an ethical point of view, both risks and opportunities may arise from the use of IMIs. Central concerns about IMIs deal mainly with the risks in the course of diagnosis

and of treatment. Moreover, there are concerns about the quality of many programs, as these are not currently subject to uniform quality assurance. Furthermore, the prospects of IMIs are frequently discussed in the context of positive empirical evidence, which suggests that the withholding of IMIs as a complementary treatment option for afflicted persons is ethically questionable. As outlined above, findings show that, for many disorders, IMIs have good impact that is comparable to the respective gold standard of care. In addition, IMIs have the ability to reach groups that may not want to take part in conventional treatment for such reasons as a sense of stigma, the availability of a therapist, health restrictions, or a preference for self-help. Accordingly, within the discussion, it is important to differentiate whether an IMI is meant as supplementary or replacement of treatment. While clarification of the legal aspects still applies to the former, the mostly economically led discussion of IMIs as a replacement for conventional treatment is seen ethically far more critically.

In terms of quality of IMIs, separate consideration of those offers described in this article – ideally scientifically evaluated self-help programs – and the variety of commercial, non-science-based treatment sites on the Internet must be taken. Total commercialization of the market can be seen as problematic, because the quality of the commercial offers in many cases cannot be guaranteed or is transparent to users. Ethical guidelines featuring high quality, reputable IMIs are needed in order to protect persons concerned against dubious offers and to provide guidance in selecting effective programs. Mandatory regulations for quality assurance, however, do not exist at present on a European level and only with regard to some indications in some European countries on a national level, such as the UK and the Netherlands. Recently however, the first attempts are being made to improve this lack of quality assurance by the development of an EU-wide platform for e-mental health innovation and implementation (Interreg North-West Europe, 2016). Although this so-called eMEN program will only be completed by 2019, conceivably, in the long term, only IMIs which demonstrate the highest possible patient safety and desired quality of care and that have been shown in randomized clinical trials to be effective would be systematically integrated into health care. Desirably, this would lead to the costs borne by the service providers being taken over by national healthcare systems as well, as is the case with other medical products.

Confidentiality Aspects

Specific control measures for confidentiality aspects, data protection management, and ethical issues are determined by on a national level in Europe law. Examples for relevant regulations on a European level include the following: the

EU Good Clinical Practice Directive (2001/20/EC); the charter of fundamental rights of the EU (2000/C 364/01); Directive 95/46/EC (amendment 2003) of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the protection of privacy, storing of personal data and on the free movement of such data; Directive 95/46/EC on the protection of individuals with regard to processing of personal data and on the free movement of such data Council Directive 83/570/EEC amending Directives 65/65/EEC, 75/318/EEC and 75/319/EEC dealing with proprietary medicinal products.

Examples for relevant areas of data protection include among others, measures relating to (1) access control; (2) admittance control; (3) disclosure control; (4) input control; (5) commission control; (6) availability check; and (8) separation of data according to purpose. As the former items indicate, the scope of data protection management covers not only the legal field but also relates to aspects of technology and organization. Examples of these include professional protection (with firewalls implemented as a hardware solution) and the performance of backups on a regular basis. In addition, personal data and communications should always be transmitted and stored in encrypted form; and communication over insecure channels such as email should not be used, as there can be no assurance of the prevention of unauthorized access to the communication history. In order to meet these extensive measures in the development and implementation of IMIs, the consultation of experts in the field of data protection is recommended. However, at the moment there are no clear guidelines on quality criteria with regard to data protection, or data safety across Europe.

Implementation in Routine Care

While IMIs are established as part of routine care in some European countries, such as the Netherlands, Sweden, Norway, or England, IMIs are less-widely integrated in the mental health care in most other European countries. In some countries, such as Germany the implementation is restricted by professional legal regulations, such as the forbid to carry out psychotherapy fully online without a personal contact. In other countries, IMIs are yet not part of the reimbursement system. Hence IMIs are used so far across Europe mainly within defined pilot projects such as the Mastermind project which aims to implement IMIs for depression in 11 European countries (Vis et al., 2015).

The WHO has among others identified barriers to implementation of IMIs in routine care. First, there is a lack of recognition of technology as an approach to health

assessment and treatment. This is reflected in limited or no reimbursement for contact between therapists and patients in the health services. Second, there is still limited knowledge about the health effects of IMIs for mental health disorders within the healthcare services. Even though there is now an app for most psychological disorders and complaints available in app stores, only a few are tested in RCTs. This makes health professionals uncertain about benefits and risks related to available IMIs. Hence more effort is needed to transform evidence-based interventions that have been systematically tested in research settings to being routinely available for clinicians. Maybe as a consequence of the first two, there is a lack of prioritization of IMIs for mental health disorders in the healthcare services. While modern somatic medicine is dependent on advanced technology the field of mental health has not started to prioritize digitalizing mental health services at local, regional, national nor international levels. In countries dominated by a large public health sector, the lack of integration with existing IT systems in the sector, such as electronic patient records, is a barrier to the implementation of IMIs. Hundreds of IT systems coexists in the health sector, therefore integration with existing systems is often a prerequisite for implementing new systems. Taken together, these barriers need to be addressed at an international and national level in order to facilitate the dissemination of evidence-based and secure programs throughout Europe.

Conclusion

IMIs are flexible, technically diverse methods which lend themselves to a variety of application areas and indications of varying degrees of severity. As empirical findings on the impact of human support clearly suggest, IMIs are seen less as a substitute for conventional psychotherapeutic interventions, and should rather be understood more as a useful addition to the treatment spectrum. IMIs have an ability to reach target groups in a way not yet achieved by classical onsite activities, and on the other hand, can excellently accompany conventional psychotherapy and thereby reduce cost or increase effectiveness.

Findings suggest the effectiveness of stand-alone IMI-based therapy in routine conditions, although further research is needed. Unlike for illnesses such as anxiety and depression, though, the evidence base of IMIs for many other disorders is yet fragmented, especially when delivered under routine care conditions. Little is known about how blended IMI concepts and Face-to-Face services can be optimally combined in order to improve the effectiveness of current psychotherapeutic methods. The continued use of IMIs in routine care raises a number of relevant

questions; how to maximize the full potential of such approaches, on the one hand, while ensuring patient safety and certainty of care on part of the leading therapists on the other. An important next step will be to develop standards for data protection and quality control within such approaches, as well as standards to ensure patient safety during crises. Likewise, financing models on national levels that allow both patients and therapists to benefit from IMIs must be developed. Moreover, the potential of such approaches can only be fully exploited if not only patients want them, but also only if therapists use them. Hence, there is a need for studies that evaluate how to overcome common therapist's prejudices and negative opinions about the use of technologies in clinical settings. Once these basic structural questions have been elucidated it will be possible to use the vast potential of IMIs for the further improvement of healthcare systems across Europe.

Conflict of Interest

DDE reports to be a stakeholder of the Institute for health training online (GET.ON), which aims to implement scientific findings related to the present research into routine care. He also received consultancy fees from several companies, such as Minddistrict, Lantern, and German health insurance companies. All other authors don't report any conflict of interest.

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