



Trends in e-Psychology

Texts from the e-Mental health module

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Introduction

1. Study guide

This module on e-mental health consists of three main parts.

We will first take a look at current challenges for mental healthcare and how technological innovations might help to address these issues.

Following that introduction, you will learn more about four specific technologies.

1. E-mental health, and online interventions in particular.
2. mHealth, with a focus on smartphone apps.
3. Wearables, as a very specific and promising subcategory of mHealth.
4. Virtual reality therapy

A theoretical background is provided for each of these technologies as are possible advantages and disadvantages. To conclude, we then recapitulate the main ideas of this module and take a look at what the near future of mental healthcare might look like.

Challenges and technological innovations

2. Framework

The World Health Organization (WHO) proposed in 2005 that *“there is no health without mental health”* (WHO, 2005, p.11). This statement illustrates the growing emphasis in high-income countries on the importance of not only a healthy body, but also a healthy mind. But what is mental health exactly? Among the many definitions available, Maercker and Zoellner (2004, p.42) consider mental health to be a broadly termed construct *“... defined as a processing function not only to feel good about oneself, but also to develop good social relationships; engage in productive, creative work; and combat subsequent stress effectively”*. The WHO (2001, p. 1) seems to concur with this point of view and defines mental health *“as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community”*. When one or more of these conditions are not met, people face mental illness.

If such symptoms arise, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR, American Psychiatric Association, 2000) and the International Classification of Diseases (ICD-10, World Health Organization, 2008) are classification systems that can be used to diagnose common mental disorders like depression and anxiety. Approximately 50% of the US-population meets criteria for one or more of these mental disorders in their lifetime, whereas about 25% of the population meets criteria in any given year (Kessler & Wang, 2008). However, prevalence rates have high variability among countries. Because recent WHO studies showed that the highest prevalence estimates were documented in the United States of America (Kessler et al., 2009), these numbers should therefore be interpreted with caution. European data are available both from population studies and from primary care settings. In ESEMeD, a European population study, Alonso et al. (2007) found a more modest number compared to that of the US, with a lifetime prevalence of around 26% and a prevalence rate in the past year of almost 12%. Among all disorders, the most common mental disorders in the past year were anxiety disorders (6%) and mood disorders (4%). Although it may seem sensible to think that the actual prevalence rates are somewhere in-between the American and European ones, there are several reasons to assume that these still gravely underestimate the total rate of psychological dysfunction in the population.

A first reason is that several specific criteria are required in order to be officially diagnosed with a mental disorder. When failing to meet only one criterion, the person's state would not be considered a mental disorder, but would still be associated with dysfunction or impairment. For depression, for example, there is a vast amount of evidence indicating that a dimensional approach is more valid than a categorical approach (Blatt, 1974; Haslam, 2003; Kendler & Gardner, 1998; Ruscio & Ruscio, 2000; Solom et al., 2001, cited in Luyten & Blatt, 2007). Several authors have therefore already suggested that, at least for this

disorder, arbitrary consensus-based cut-off criteria should be open to re-evaluation (Brown & Barlow, 2005; First, 2005; Luyten & Blatt, 2007). A second point is made by Moffit et al. (2010), who remarked that prevalence rates are often, if not always, determined with retrospective studies. However, such studies may undercount lifetime prevalence rates due to recall failure. In order to test this hypothesis, a prospective longitudinal study was conducted that determined the prevalence of lifetime disorder up to the age of 32 for anxiety and depression. Results showed that the prevalence rates were approximately doubled in prospective as compared to retrospective data for both disorder types. In general, there are strong indications that a vast part of the population is at least once in their lifetime confronted with some form of mental illness. Such a confrontation should not be taken lightly, as mental disorders have a substantial contribution to disease. Their impact can be measured in terms of disability-adjusted-life years (DALYs), which is an integrative measure of overall disease burden (Murray & Lopez, 1996). Worldwide, depression currently accounts for one tenth of all DALYs, which is similar to the 11% DALYs attributed to cancer (Prince et al., 2007). Projections of global mortality and burden of disease expect depressive disorders to be one of the three leading causes by 2030, together with HIV/AIDS and ischemic heart disease (Mathers & Loncar, 2006).

Within a given primary care centre, screening is sometimes done using the Diagnostic Manual of Mental Disorders Primary Care Version (DSM-IV PC; American Psychiatric Association, 1995), but as Williams, Noël, Cordes, Ramirez, and Pignone (2002) point out, more often short instruments are used like the Beck Depression Inventory (BDI; Beck, Ward, Mock, & Erbaugh, 1961), the Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) or the Patient Health Questionnaire (PHQ-9; Spitzer, Kroenke, & Williams, 1999). Although these instruments strictly cannot be used to diagnose mental disorders, these are often used as provisional ways of detecting them. Similar prevalence rates can also be found here, with depression in the past year for example between 1% and 10% (Bartholomeeusen, Kim, & Mertens, 2005; Lamberts, Oskam, & Hofman-Okkes, 1994). The reason why these numbers appear lower compared to the larger epidemiological studies might be twofold. On the one hand general practitioners (GPs) can use slightly different criteria to determine specific mental disorders, which do not always correspond to those of manuals like the DSM-IV-TR. Furthermore, GPs have to be vigilant for a very wide range of (mental) disorders, some of which have low prevalence and incidence rates in the population and therefore might go undetected (Buntinx et al., 2004). On the other hand, on average 69% of patients with depression and 76% of patients with mood or anxiety symptoms only report physical problems (De Lepeleire, 2011). During a consult, time is often limited and both patients and GPs have to prioritize which issues to address. When such competing demands are present, physical complaints receive more attention compared to psychological complaints (Klinkman, 1997), which reduces the number of detections of mental disorders.

In conclusion, mental disorders have a significant impact on the general population, and these are only expected to increase in the following decades. This outlook is especially relevant for healthcare in high-income countries. Although prevalence rates are also similar in low-income countries, the main priority there remains to address communicable diseases, whose impact is a much larger compared to high-income countries (WHO, 2010). For these high-income countries, mental healthcare (MHC) may already make up a larger portion of the healthcare system, but an additional increase in the number of people affected and seeking help should still be anticipated. Even when more conservative numbers are considered, it appears that the majority of people with mental disorders lack access to professional care. Currently, less than one in three receives treatment (Bebbington et al., 2000a; Bebbington et al., 2000b, Kessler et al., 2005).

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#eMentalHealth

3. Framework

E-mental health is “... a generic term to describe the use of information and communication technology – in particular the many technologies related to the internet – when these technologies are used to support and improve mental health conditions and mental healthcare” (Riper et al., 2010). E-mental health interventions have proven to be effective, efficient and cost-effective for depression, anxiety, posttraumatic stress, eating disorders and a wide variety of other forms of psychopathology (Griffiths, Farrer, & Christensen, 2010). Most of the time, interventions are based on cognitive-behavioral therapy (CBT; Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010), although recently the first studies based on psychodynamic therapy have also been conducted, which show similar positive results for depression and anxiety (Andersson, et al. 2012; Johansson et al., 2012). In addition to treatment, e-mental health interventions can also be used for prevention and in primary care, in which they have a large potential to reduce disease burden primarily because they permit a low-cost, widespread dissemination (Christensen & Hickie, 2010). Their delivery can occur through a partnership within existing primary care structures (Hickie et al., 2010) or through a virtual clinic environment supervised by health professionals (Andrews & Titov, 2010). The first option has the advantage of being a part of the regular mental health services and can also offer a first step towards access to more traditional person-based services for those who might not otherwise seek care (Ruggiero et al., 2006). The latter has the advantage of anonymity and easy access for people who experience stigma concerning their mental health problems. Both options are not mutually exclusive as an intervention can be tailored for both delivery methods.

One example is the ‘Kleur je Leven’ (Colour your Life) intervention. Originally developed by the Trimbos Institute and based on the psychoeducational ‘Coping with Depression’ course (Cuijpers, Muñoz, Clarke, & Lewinsohn, 2009), a Belgian version has been adapted by ISW-Limits (2009). Participants can enroll independently on or can be referred to the intervention by their GP. This online cognitive behavioral self-help intervention helps them cope with mild to moderate depressive feelings. In eight weekly lessons (and one booster session) participants are taught insights and skills to deal with depressive feelings. The website makes use of streaming video material of ‘models’ (actors playing participants), voice-overs, interactive exercises, a mood diary, homework and a workbook. Each lesson has a fixed structure in which 1) the topic of the lesson is introduced, 2) the participant completes a questionnaire on the homework from the previous lesson, and 3) the curriculum with some assignments is run through. Afterwards 4) instructions are delivered for the new homework assignment and 5) the lesson is evaluated. The specific knowledge and skills consist of 1) information concerning the origin of depressive complaints and the relationships between, thinking, acting and feeling, 2) techniques to improve relaxation, 3) techniques to plan and undertake more fun activities, 4) techniques to reduce worrying, 5) skills in constructive thinking,

through detecting mood deteriorating thoughts and challenging these in order to improve participant's mood, 6) skills in coping with problems experienced with (significant) others, and 7) increased assertiveness by expressing feelings and thoughts and standing up for themselves (ISW Limits, 2009).

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4. Advantages & disadvantages

Diminishing thresholds

The internet drastically increases the ease at which clients can obtain professional help for their mental health problems. First, it allows therapies like CBT to be offer to a much larger audience, compared to the limited number of high-earners with a great deal of time and patience who used to be the only ones with access to this 'privilege'. Offering online interventions, furthermore, does not necessarily require input

from trained therapists, which makes e-mental health relatively cheap and also reduces waiting lists, if not completely avoids them.

Aside from the cost reduction, there are also a number of other advantages. One is anonymity, as online interventions reduce the potential issue of stigma, which is still very real when seeking help for mental health problems. A third is that e-mental health allows clients to work at their own pace and time: as therapy is available 24/7, office hours no longer matter. A fourth advantage is that online interventions often require clients to work by independent, learning to deal with their issues themselves. Progress therefore increasingly becomes an own achievement rather than one of the therapist who 'helped you to overcome your issues'. A fifth and final advantage is the low threshold, possibly also allowing to reach people who are currently not reached using traditional techniques. Overall, e-mental health interventions seem like promising tools to overcome the discrepancy between supply and demand in mental healthcare (Andrews, Cuijpers, Craske, Evoy, & Titov, 2010).

The problem of adherence: is a computer an acceptable therapist?

One of the major issues for internet interventions is however the low adherence. If we focus particularly on interventions on depression, drop-out rates are high, with on average 38 to 90 percent of clients ending their participation after just one session and on average only 32 percent fully completing interventions (Melville, Casey, & Kavanagh, 2010). Interventions that are not completely unguided but also offer some coaching or guidance, do seem to report higher adherence rates (Cheng & Dizon, 2012).

An important question nevertheless remains whether such therapy is acceptable for clients and what their general attitude is towards an online approach. Although there are relatively few studies focusing on acceptability, the ones conducted so far might provide some insight (Kaltenthaler, Sutcliffe, Parry, Beverley, Rees, & Ferriter, 2008). When Titov, Andrews, Davies, McIntyre, Robinson and Solley (2010), for example, evaluated the online intervention 'The Wellbeing Program' they found very high client satisfaction. An important caveat here is that the intervention was guided. Other studies focusing on client satisfaction generally found that the majority of clients still preferred some sort of guidance or contact with a mental health professional (Berger, Hämmerli, Gubser, Andersson, & Caspar, 2009; Mohr et al., 2010). Mere online self-help interventions only seem relevant for a specific subgroup of clients, described by Bendelin, Hesser, Dahl, Carlbring, Nelson, and Andersson (2011) as 'doers'. Doers prefer to work on their own, have a practical approach and actively apply the principles they learn in their everyday lives. To them, the computer is a more than acceptable therapist.

Some research evidence also puts the adherence issues into some larger perspective. Meyer, Berger, Caspar, Beevers, Andersson, and Weiss (2009), for example, found that a great deal of clients participating in the online intervention Deprexis experienced lasting positive effects, despite the fact that they followed

a limited number of session. This phenomenon is not surprising and also found in 'regular' face-to-face therapy, where clients experience the largest therapeutic effects during the first sessions of their treatments. After reaching a sufficient level of improvement, the treatment is terminated, despite the fact that the program is not finished. The researcher however considered this an effective means of self-monitoring: instead of speaking about drop-out, when someone terminates an online help intervention, the number of sessions successfully run through is referred to as the intervention 'dosage'.

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#mHealth

5. Framework

Mobile applications or apps are gradually making an entrance in mental healthcare. For psychology, they hold the potential to extend the reach of mental health care, but also to improve current psychotherapy. Although mental healthcare was somewhat slow to catch up and is lagging behind medicine in terms of technology adoption, the recent proliferation of apps focusing on a great variety of mental health problems are a clear indication that all of that will change in the near future (Erhardt & Dorian, 2013).

The amount of applications distributed amongst the general public is vast, but the number of applications that have really been thoroughly put to the test are limited. In 2013, a systematic review was set up focusing on the evidence that supported the efficacy of mental health apps. During a comprehensive literature search, Donker, Petrie, Proudfoot, Clarke, Birch and Christensen (2013) included all trials that examined the effects on mental health apps on a wide variety of mental health disorders, i.e. depression, anxiety, substance use, sleep disturbances, suicidal behavior, self-harm, psychotic disorders, eating disorders, stress, and gambling. Trials were only included if they examined to effects with a pre- to post-intervention design or compared them with a control group, which could consists of waiting lists, treatment-as-usual, or other recognized treatments. The researchers only found eight papers meeting inclusion criteria. These papers described five apps which targeted depression, anxiety and substance abuse. As for efficacy: results showed significant reductions in symptoms, as within-group and between-group intention-to-treat effect sizes. Although results were positive, these had to be interpreted with caution, given the small number of studies, the high risk of bias and the unknown efficacy of long-term follow-up.

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6. Advantages & disadvantages

As with any new technology, apps have both advantages and disadvantages. After some online browsing on what is currently available, you might come to the conclusion that *“most healthcare apps are predictable, incremental solutions to what already exists on the web, with poor usability and value back to the stakeholders”* (Afkhami, 2014, slide 16). This valid remark also highlights the main

issue with apps, aside from their content, which is the difficulty to identify safe, effective ones. This is not only a requirement for clients, but also for therapists. Despite the fact that most healthcare apps might not add much, there are currently still thousands of apps in the different app stores available that might be innovative and have added value, but that have received little review or clinical validation (if any).

Some suggest that the idea of app certification by specialized organisations might be a suitable approach to this issue. Such an approach might however not be a practical strategy, as it will probably only affect a small fraction of all apps currently available. Evidence for this statement can be found in the recent suspension (and subsequent takeover) of Happtique, which was a commercial organisation with just that goal: to certify health care apps (Chan & Misra, 2014). So, what would be a more viable solution? One suggestion is to empower the end user (both therapists and clients) to become more 'app literate', which might be a quicker and efficient large-scale solution. However, that might be easier said than done. When briefly looking at existing literature, Erhardt and Dorian (2013) found that

“Many psychologists are likely to harbour mixed feelings regarding the inevitability that mobile technology will become an increasingly integral part of clinical practice over the coming years. Recent surveys have documented a relatively low rate of newer technology use among independent practitioners (McMinn, Bearse, Heyne, Smithberger, & Erb, 2011). In addition to feeling overwhelmed by the demand to “keep up” with technologies that are accelerating at a mind-boggling rate, contributing factors may include a degree of “technophobia” (Eonta et al., 2011) related to lack of familiarity with and confidence in emerging technologies in general, absent graduate or post-graduate training related to their use, and ethical uncertainties associated with their integration into clinical practice. At a basic level, many practitioners are curious about the potential of apps to enhance their practice and eager to stay competitive with other health care professionals who are embracing this technology, but find themselves unsure of the potential clinical uses of apps and how to implement them (Erhardt & Dorion, 2013, p. 15).”

However, if you are currently open to the idea of using apps in therapy, how would you approach this? There are still a number of interesting repositories available, for example the [NHS's Health Apps Library](#) (NHS, 2015) or [Patientview's my health apps](#) (Patientview, 2015), which might already provide you with a number of interesting apps. However, what if you stumble upon a fairly new app, which has not yet been reviewed, but does seem to be promising? How would you evaluate whether

or not it is something you could in therapy and actually recommend to a client? One solution might be to use [Patientview's Health apps toolkit](#), which contains a checklist (starting from page 29) to determine whether an app might be appropriate. The six steps to guide your decision are: (1) What does the app do, (2) Does the app work, (3) Will it work where I need it, (4) What does it really cost?, (5) Do I trust the people who created it, and (6) Can I trust this app with my data and privacy? (Patientview, 2015).

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#Wearables

7. Framework

Wearables have already been playing a role for quite some time in psychological research and are now increasingly used in the gathering of physiological data (Yerkes, 2004). To get an idea of the current possibilities, we will therefore take a look at a number of existing studies. A first study focuses on data obtained using accelerometers, as these can provide us with information on the movement patterns of people wearing them. The 'National Health and Nutrition Examination Study' (2005-2006) used these to obtain data on the physical activity of over 4000 adults (Song, Lee, Baek, & Miller, 2012). For one week, participants were asked to carry a little device on their right hip. No further action on their end was required, except to keep it dry and to remove it just prior to bedtime. Their physical activity was registered every minute, which allowed the researchers to divide their activity into four main categories: (1) sedentary, (2) light intensity, (3) moderate intensity and (4) vigorous intensity. Subsequently, the participants with mild ($n = 564$) and moderate to severe ($n = 227$) depressive complaints were compared with the participants with minimal depressive complaints ($n = 3267$). Results showed no difference between groups regarding sedentary and high intensity physical activity. The researcher did find that participants with minimal depressive complaints outperformed those with mild to severe depressive complaints in terms of light and moderate intensity physical activity. The data from the accelerometers furthermore also showed that moderate intensity physical activity had a significant effect on depressive complaints, independent of a wide range of control variables like age, gender, race, income, relationship status and self-reported health. Anyone who was active at a moderate intensity for at least three days a week, for thirty minutes a day (in accordance to the guidelines for physical activity of the Centers for Disease Control and Prevention), was 28% less likely to have depressive complaints compared to those who did not.

The usability of other types of data, like heart rate variability (HRV), might be less obvious for psychology. There are however possibilities, for example by combining ECG-equipment with a smartphone application to measure stress. In a study by Morris and Guilak (2009) such an approach allowed college students to successfully reduce their symptoms of stress. More specifically, the app offered them tailored cognitive behavioral techniques during times of stress, based on the HRV measured by the wearable. The effect of using these techniques was immediately registered and offered as a feedback to the participants, as a visualization of their breathing. Finally, Villarejo, Zapirain and Zorrilla (2012) chose for a non-interventional approach in a study making use of sensors to measure skin conductance. Based on the obtained data they managed to successfully distinguish

between different situations and tasks in which participants were (or were not) experiencing stress, more specifically: being relaxed, conducting mathematical calculations, quick breathing and speed reading.

In conclusion, psychological research shows that wearables have the capacity to measure symptoms more reliably and with higher validity. They furthermore allow to gather additional physiological data, which provides us with the opportunity to gain more insight in the effects of counseling and treatment. Finally, wearables may also offer the possibility to offer more specific feedback to clients at the right place and the right time.

Based on Van Daele T. & Vanhooymissen, T. (2015). Draagbare technologie in de geestelijke gezondheidszorg [Wearables in mental health care]. *Tijdschrift Klinische Psychologie*, 45(1), 9-14.

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8. Advantages & disadvantages

It seems rather obvious that it will not be easy to implement the current generation of wearables in clinical practice. Challenges remain, both technological and clinical. More specifically, there appear to be four main challenges. A first challenges relates to the quality of the obtained data. In 2013, there were for example still large differences found in the accuracy of a wide range of commercially available wearables, all of which purported to measure the exact energy expenditure of the person wearing them. Prototypes of new devices are however getting increasing better and now have an accuracy (at least for energy expenditure) of around 90% (<http://www2.imec.be>). A second, much larger limitation is the 'big data' issue, as continuous monitoring results in huge amounts of information. Making correct analyses and interpretations, and presenting the results in a clear manner is an enormous challenges. Although algorithms and statistical techniques to find patterns in these complex data are currently in full development, a complicating factor is the constatation that there are large intra and inter individual differences, as research in the physiological detection of emotions has already shown (Bulteel et al., 2014). Aside from the methodological and the statistical support, the development of specific software is a third challenge we need to overcome in order to unlock the full potential of wearables. On the one hand, we need software programs that analyze

and present data in an insightful manner. On the other hand, we also need mobile applications that provide the user – if they wish – with direct feedback based on that data. A fourth and final challenge is the requirement for technological solutions to proof their added value for clinical practice. The fact that wearables are currently reliable and useful in controlled studies, does not necessarily mean that they live up to the same standards when they are being regularly, routinely used by therapists.

Matching research to clinical practice also entails a number of obstacles. Therapists are currently insufficiently familiar with wearables and they do not have the background or tools to adequately use them in their existing methodologies. Although future therapists already gain a number of necessary basic competences during their training, it will probably also be necessary to offer additional continuous education, in order to anticipate these technological developments. The competencies that therapists have to acquire are technical, like knowing how to use wearables in a valid and reliable manner, as for as hardware and software is concerned. However, these competences are also conceptual: the neuropsychological and physiological knowledge that already plays a prominent role in the curriculum should at least be maintained, and probably even increased. There is furthermore also a need to elaborate on the practicalities of dealing with physiological data in clinical practice and how to interpret them.

Based on Van Daele T. & Vanhoomissen, T. (in press). *Draagbare technologie in de geestelijke gezondheidszorg [Wearables in mental health care]*. Tijdschrift Klinische Psychologie.

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#VirtualReality

9. Framework

What makes virtual reality therapy an effective means for treating anxiety disorders using exposure therapy? One of the main, recurring explanations is that during virtual reality therapy a 'sense of presence' is created. It may not only be an important aspect, but even a necessary requirement and a principle mechanism for treatment to be effective.

Sense of presence can be defined as *"... the illusion of non-mediation, which means the user of some technology believes they are actually in a virtual space, and they fail to account for the fact that they are actually interacting with a piece of technology"* (Seibert, 2014). The most spectacular example of creating a sense of presence might be using virtual reality head mounts, but this feeling is technically not limited to this approach, as you may very well experience this also when for example watching television or when going to the movies (Vorderer, Klimmt, & Ritterfeld, 2004).

In a large meta-analysis, Ling, Nefs, Morina, Heynderickx & Brinkman (2014) looked at the evidence for this claim, as existing studies did find mixed results on the importance of the necessity of a sense of presence and for a correlation between the level of sense of presence and the anxiety clients experienced. After searching the literature and retrieving 33 publications (with a total of almost 1200 participants), correlations were extracted and meta-analyzed. Results showed a medium effect size ($r = .25$) for the correlation between both, although this differed over different anxiety disorders. Large effects were found for fear of animals ($r = .50$), but a no effect size for social anxiety disorder ($r = .001$). Furthermore, the correlation was stronger in studies with participants meeting the criteria for anxiety disorders, compared to studies with participants from a non-clinical population. The field of view from displays also had a moderating effect, as studies making use of head mounts with a larger field of view reported stronger effects. The meta-analysis in conclusion showed that there indeed is an important, positive relation between sense of presence and anxiety. It nevertheless also demonstrates that this relation can easily be influenced as, it can be affected by various moderating factors.

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10. Advantages & disadvantages

The main advantage of virtual reality therapy over 'regular' therapy is fairly obvious, as therapists equipped with the right software and hardware can easily create safe, highly controlled environments for therapy, without the need to even leave one's office. One application with a clear advantage can for example be found in a study by Krijn, Emmelkamp, Olafsson and Biemond (2004). These researchers looked at exposure therapy for fear of flying and concluded that virtual reality therapy is not only cost effective, but components of the flight can be repeated endlessly at great ease, with different weather and flight conditions that can be created just in seconds. As far as effectiveness goes, several studies found similar effectiveness, which makes virtual reality therapy a valid and maybe even a preferable alternative to traditional exposure therapy.

Virtual reality does not only have advantages. The main disadvantage lies exactly in what makes virtual reality therapy so promising: the (attempt of an) immersive experience and how our body responds to the misleading signals of a 'fake world'. As virtual reality therapy affects our motion detection system, several side effects are not quite uncommon, including nausea and motion sickness (Bless & Wertheim, 2000). Motion sickness in a simulator is referred to as simulator sickness, which is described by Blade and Padgett (2002, p. 23): *"Various disturbances, ranging in degree from a feeling of unpleasantness, disorientation, and headaches to extreme nausea, caused by various aspects of a synthetic experience. Possible factors include sensory distortions such as abnormal movement of arms and heads because of the weight of equipment, long delays or lags in feedback, and missing visual cues from convergence (when the left and right eye images become fused into a single image) and accommodation (change in the focal length of the eye's lens to maintain focus on a moving close object)"*. When reviewing existing studies on virtual reality therapy, Gregg and Tarrier (2007) found high numbers of motion sickness symptoms: following immersion in a virtual environment, 80% of all participants report this feeling, with 5% even being unable to complete the immersion because the effects were so aversive. Although some habituation seems to occur, with only negligible side effects remaining after roughly three immersions, it is something to be cautious about. Although developers are currently working on ways to avoid this feeling in the future, by creating more realistic displays with less judder and more fluent environments (which are in part responsible for the issue), it might still take some time before this problem is adequately addressed.

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Future = blended care

11. Framework

How might the future of mental healthcare look? Although this is of course speculation to some extent, an educated guess might still be possible. It seems highly likely that technology will play an increasing role in clinical practice. More specifically, two complementary trajectories could develop over time.

A first trajectory offers specialised online interventions, which make use of the specific strengths and characteristics of online interventions, for example the anonymity and the ease to access help from the own home. In the second trajectory technology innovations will be interwoven, or 'blended', with regular mental healthcare interventions. Websites, smartphones, wearables and virtual reality therapy will become an obvious part of therapy and will hopefully not only change, but also improve how both therapists and clients deal with mental illness. The term blended therapy might now be on the rise, but in the future, we will probably think of this approach as 'mere therapy', as it will be the default means of delivering mental healthcare. The current practice of therapy without any technological additions, however, will become the exception to the rule.

We should however remain cautious for a 'Wild west culture' in e-mental health, as Ruwaard and Kok (2014) call it, in which we implement technological innovations, before we have actually taken the time to thoroughly validate them. Make no mistake: there is still much research to be done on what works, for whom, and in which conditions. Luckily, progress is being made, albeit gradually. Does this imply that in the meantime, therapists and clients who are willing to use the technology that is currently readily available should put their desires and ambitions on hold? Of course not: you should not hesitate to make use of what technology already has to offer for mental healthcare. It does remain important, however, to be mindful of possible risks and disadvantages of particular technological innovations and to always use technology primarily (if not even solely) for the sake of creating added value to treatments.

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