Modes of Delivering Psychotherapy: Investigating Technology

Ebrahim Oshni Alvandi, Monash University, Melbourne, Australia
George Van Doorn, Federation University Australia, Churchill, Australia
Mark Symmons, Monash University, Melbourne, Australia

ABSTRACT
The ubiquity of telecommunications technologies and the internet facilitates offering different mental health services to the public, and the ongoing advancement in technologies introduces new venues to a range of psychotherapeutic services. It is critical to all clinicians and professionals in information and communications technology to have a clear understanding of the opportunities and challenges of these technologies. This article outlines the technologies that are currently used as part of psychotherapy. In particular, the paper discusses some of the current state of clinical research, advantageous and disadvantageous that relate to the use of these technologies.

KEYWORDS
Assistant Psychotherapists, E-Mental Health, Mobile Applications, Telecounselling, Virtual Reality

INTRODUCTION: HISTORICAL BACKGROUND AND TELEPHONY-BASED APPLICATIONS
Counselling services traditionally offer ‘treatment’ in a private, face-to-face setting (e.g., an office or clinic). Technology-based counselling services, however, have surfaced as an alternative means of therapy where patients do not have access to in-person services. These services have been available for several decades. For example, the Australian Royal Flying Doctor Service (RFDS) used the Morse Code, a coding system to transmit messages via the electromagnetic telegraph, was used in 1928-1929 by the Royal Flying Doctor Service (RFDS) in Australia to provide telehealth to remote areas (Margolis & Ypinazar, 2008; Persson, 2010). It was in the 1930s that the service called ‘Voice Radio Therapy’ was introduced and serviced remote areas of Australia by telephone. The use of telephone technology in psychotherapy continued in later years. For example, in an attempt to prevent suicides, the Samaritans' began the first telephone counselling service (called Lifeline) in London in 1953 (Hornblow, 1986) and four years later in 1957, three telephone counselling providers were established in the United States of America (Hornblow, 1986). In Australia, the first Lifeline service was officially introduced in 1963 (Coman, Burrows, & Evans, 2001), but it was during the 1970s that telephone technology services have provided psychotherapy services (see Lester, 1974 and Regan, 1997).
Since the 1980s, telephone psychotherapy has been recognised as a valued alternative to traditional face-to-face therapy and has been used to deliver various mental health services (Reese, Conoley, & Brossart, 2006; Robinson, 2009b), for instance, to provide care for obsessive-compulsive disorder (OCD) and depression (Lam, Lutz, Preece, Cayley, & Walker, 2011; Lerman et al., 1992; Marcus et al., 1993; Turner et al., 2014). Telephone counselling has also been effective in helping clients with the psychological issues associated with cancer (Badger, Segrin, Pasvogel, & Lopez, 2013; Bastian et al., 2013), with disability as an adult (Evans, Halar, & Smith, 1985), with smoking cessation (Bastian et al., 2013; Stead, Hartmann-Boyce, Perera, & Lancaster, 2013; Zhu et al., 1996), and with HIV infection (Velthoven, Brusamento, Majeed, & Car, 2013).

Given the success of telephone counselling, it is not surprising that the usefulness and appropriateness of other technologies for therapeutic purposes has been assessed. Several studies have identified the benefits or disadvantageous of those services, ethical and organizational issues, and the therapeutic outcomes achieved using differing technologies (see Haberstroh, Parr, Bradley, Morgan-Fleming, & Gee, 2008; Lovejoy, Demireva, Grayson, & McNamara, 2009; Richards & Viganó, 2013a; Schultze, 2006). For example, instant messaging, chatting, and video conferencing facilitate a person’s ability to access services in spite of one’s geographical distance from the service. These telecommunication systems open up new possibilities for communication between therapists and clients. This was the reason the current article outlines the story of use of technology in psychotherapy. The review will classify the technologies that have been used in psychotherapy and will also discuss some of the advantageous and disadvantageous that relate to the use of these technologies.

As a basis for this literature review, technologies have been categorised into four categories. Firstly, Internet-based technologies are covered with attention to the advantageous and disadvantageous of these technologies as a common medium of therapeutic delivery. Secondly, stand-alone platforms including mobile applications and technologies designed for automated self-help services are reviewed elucidating some of the challenges in using such automated systems in psychotherapy. The third category covers the use of 3D, and Virtual Reality (VR) therapeutic technology tools and the final category focuses in assistant therapists.

The material for this study was mainly drawn from the peer-reviewed literature in which the terms “computer-mediated therapy,” “tele-counselling,” “e-health,” “internet-online counselling,” “videoconferencing,” “asynchronous therapy,” “synchronous therapy,” “Virtual Reality” were used. These terms were also used in a search of the databases EMBASE, PubMed, PsychINFO, and Google Scholar to gather articles on technology-based therapies, but no specific method was used to filter the clinical or experimental content of the papers reviewed.

INTERNET-BASED TECHNOLOGIES

In addition to telephone technology, the advancement in telecommunication technologies including internet facilities has introduced new modes of providing a range of psychotherapeutic services to the public. Three forms of internet-based technology in particular have been identified as potential tools for remote forms of psychotherapy: Blogs and forums, social media and interactive technologies.

Blogging and Forums

Blogging and forums are the first routes that are not, necessarily, aimed at generating therapeutic outcomes for the user. These technologies are generally used to deliver a tutorial on potential psychological treatments (Bennett-Levy, Thwaites, Chaddock, & Davis, 2009; Farrand, Perry, & Linsley, 2010). Although not be considered psychotherapy and counselling per se, the information shared on blogs or forums shares many features with group therapy and can, potentially, be integrated into more traditional forms of psychotherapy. Specifically, blogging can provide self-help support to groups (Nagel & Anthony, 2009) and provides an opportunity for peer support (Jorm, Morgan, & Malhi, 2013). Also, blogging provides users with an opportunity to share their personal knowledge.
about health (Swain, 2007), while simultaneously connecting geographically disparate groups. There, however, could comment on the threats of using community-based platforms such as blogs and forums for psychotherapeutic applications. It is expected that without proper clinical supervision by professional psychotherapists, rude or imprudent posts by other users could cause severe damage to a person who already seeks help for his/her unstable psychological state.

### Social Media

There is also a growing interest in using social media, such as Facebook and Twitter, as an alternative to face-to-face therapy (Moorhead et al., 2013; Syred, Naidoo, Woodhall, & Baraitser, 2014). Similar to forums and blogs, social media can provide psychotherapeutic information, but in contrast to blogs and forums, social media allows dynamic and interactive communication between people (e.g., client and clinician) (Laranjo et al., 2014; Parikh & Huniewicz, 2015). For instance, users can communicate their concerns and seek help or advice from their ‘friends’ who interact with each other and who can share their responses or ideas via integrated digital media such as combinations of electronic text, graphics, moving images, and sound. Multimedia is a distinguished capability of social media which is seen rarely in forums or blogs.

Numerous free Facebook pages aim to raise awareness of, and prevention of, psychological disorders such as Depression and diseases such as Human Immunodeficiency Virus (HIV). These services are free, apart from the cost of an internet connection, and users are provided with access to the most up-to-date research and educational materials. These sites also provide psychotherapists with the opportunity to recommend their services. In short, interactivity, social and peer support, advertised services and access to inexpensive or free sources of information relating to specific mental health issues make social media appealing to potential clients (Moorhead et al., 2013). However, similar to forums the users’ comments should be supervised by therapists to avoid negative impacts of improper statements or expressions on the others’ psychological states.

### Interactive Technologies

The new telecommunication systems have varying degrees of interactivity that enable talking backing to the user. For example, technologies which enable synchronous communication, such as Short Message Services (SMS) such as ReachOut² or SANE³, video conferencing, podcasts, audio chatting, and instant text messaging (e.g., Yahoo Messenger) can also be used for instantaneous communication between a client and a clinician. Richards and Vigano (2013) suggest that clinicians and patients use these technologies because they are accessible from both desktop computers and portable devices, and thus help can be accessed easily if needed. Further, and from the client’s perspective, can be accessed from almost anywhere (e.g., remote settings), and the costs are competitive relative to traditional, face-to-face sessions particularly when time and transportation expenses are considered (Chung, 2013; Griffiths, 2001; Maples & Han, 2008).

Text-based communication between the client and therapist can be conducted through e-mails, instant messages and chats. Email is amongst the most commonly used asynchronous technologies for internet-based therapy (Bellafiore, Colón, & Rosenberg, 2004). With asynchronous text-based psychotherapy (e.g., email), patients and the psychotherapists have time to consider their responses and the next steps in addressing the problem (Suler, 1997, 2000). When the synchronous text-based communication (e.g., chat mode) is employed, counselling pairs can be both sure that they are online and communicate simultaneously. (Mallen, Jenkins, Vogel, & Day, 2010; Satalkar, Shrivastava, & De Sousa, 2015). Although there is a need for appointments fixed in advance, the real-time text-based communication can provide opportunities to minimize or correct misunderstandings and have instant and supportive responses. Client anonymity is also listed as an advantage of text-based and, parenthetically, audio-based psychotherapy. This has a positive effect on therapeutic outcomes by allowing the client to be less inhibited (Suler, 2004; Tanis & Postmes, 2007).
Audio chat via standard telephone lines or sophisticated Internet-based technologies such as smartphones is found in the literature most adequate, achievable and effective method of distance mental health support (Day & Schneider, 2002; Kraus, Stricker, & Speyer, 2010; Mundt, Snyder, Cannizzaro, Chappie, & Geralts, 2007). While voice chat overcomes geographical barriers, different groups of people with various mental health issues can use this technology in a single or group psychotherapy. For example, Wiener, Spencer, Davidson, and Fair (1993) reported the effectiveness of the audio-based psychosocial support for HIV-infected children and their families. Likewise, Gettings, Franco, and Santosh (2015) demonstrated that audio-conferencing was an effective method to support siblings of children with neurodevelopmental disorders. Furthermore, users of audio-based counselling services (e.g., telephone services such as Lifeline) rate the therapeutic attachment as stronger than other Internet-based counselling technologies such as text messaging (King, Bambling, Reid, & Thomas, 2006), and these services have had positive outcomes for several disorders (Choi et al., 2012; Chong & Moreno, 2012; Jang et al., 2013; Moreno, Chong, Dumbauld, Humke, & Byreddy, 2012).

When it comes to videoconferencing technologies, it is similar in many ways to face-to-face interactions. Videoconferencing sessions are a hybrid of networking, video, audio, and more that allow real-time visual and audio communication while overcoming potential issues such as travel costs, mobility challenges, socioeconomic status, and patient engagement (Casey, Joy, & Clough, 2013; Phillips, Vesmarovich, Hauber, Wiggers, & Egner, 2001). Specifically, this mode of delivery is thought to be the most credible substitute for face-to-face therapy in areas where face-to-face therapy is unlikely to be feasible, e.g., remote locations (Dongier, Tempier, Lalinec-Michaud, & Meunier, 1986; Ertelt et al., 2011).

Given the apparent benefits of using technology, it is not surprising that the usefulness and appropriateness of videoconferencing technologies for therapeutic purposes has been assessed (see Bee et al., 2008; Haberstroh, Parr, Bradley, Morgan-Fleming, & Gee, 2008; Lovejoy, Demireva, Grayson, & McNamara, 2009; Richards & Vigano, 2013; Schultz, 2006; Yuen, Goetter, Herbert, & Forman, 2012). Videoconferencing has been found to be an effective mode particularly in treating Obsessive Compulsive Disorders (Fitt & Rees, 2012), Anxiety Disorders (Rees & Maclaine, 2015), and Posttraumatic Stress Disorders (PSTD; Pelton, Wangelin, & Tuerk, 2015); the studies reported that participants experienced clinically significant reductions in their symptoms and an improved quality of life. The evidence to date is also highly suggestive that videoconferencing is comparable to face-to-face mental health care (Chakrabarti, 2015). For example, King et al. (2014) compared videoconferencing psychotherapy sessions with face-to-face counselling sessions and found that opioid-dependent individuals had responded well to treatments over the 12-week study and the two modes were equivalently effective. Further, the individuals in the videoconferencing group had high ratings of treatment satisfaction and therapeutic alliance.

In spite of positive outcomes, many practitioners and a significant research has suggested caution about the credibility and reliability of the online provision of psychotherapy (Alleman, 2002; Callahan & Inkle, 2012; Glasheen & Campbell, 2009; Lester, 2006; Robinson, 2009a; Skinner & Latchford, 2006; Wells, Mitchell, Finkelhor, & Becker-Blease, 2007). Some scholars believe it too early to be making claims regarding the long-term efficacy of online counselling for complex disorders such as depression (Dorstyn, Saniotis, & Sobhanian, 2013). These arguments are based on the belief that therapy via technology is not fully equivalent to face-to-face sessions (Barnett, 2005; DeLucia, Harold, & Tang, 2013). The main concerns address the interactivity of the session and “absence” of the counselling parties during computer-mediated psychotherapy (CMP). Taking the perspective of the clinician, therapeutic presence is the essential factor of therapeutic effectiveness (Schneider, 2015). This presence is referred as being in the moment with the client on not only physical interaction but also emotional and cognitive levels of communication (Geller & Greenberg, 2012), which the degree of such presence offered by communications media might be different than face-to-face sessions (Brahnam, 2014).
Another major area of concern is the usability of technology (McCarthy & Wright, 2004). The term usability denotes the ease with which the user can work with the technology or computerized system. Usability is the efficiency, effectiveness, and satisfaction by which users can achieve their goals with the technology (Bevan, 2001). Thus, if the user’s experience includes a lack of functionality, whether a design or human factor this will impact on the communication particularly in online counselling environments (Manhal-Baugus, 2001). For example, looking at screens, or tablet or smartphone displays for extended periods of time can cause eye fatigue and may impede engagement between users during CMP sessions (Abbott, Klein, & Ciechomski, 2008). As such, Ertelt et al. (2011) have suggested studying the impact of the size of videoconferencing devices on the therapy, therapeutic relationships, and the engagement of the client. Other limits of usability in videoconferencing, may be insufficient image quality, low framing rate, flickering, and delays that make psychotherapy process unpleasant for clients and psychotherapists (Castelnuovo, Gaggioli, Mantovani, & Riva, 2003). Moreover, the angle of a webcam and the participant’s distance from the video camera might also affect the relationship between psychotherapist and client. These factors can disturb eye-contact between the individuals (Manstead, Lea, & Goh, 2011).

There are also several technical issues apparent in Internet-based technologies that can impact this provision of psychotherapy negatively. Technical considerations for online providers, clinics or “lifelines” require IT support personnel and a secure web portal4 to deliver efficient services. Difficulties with navigation and interaction due to poor quality software can also decrease the success of therapeutic communication (DeLucia et al., 2013). For example, technical glitches such as software bugs may lead to a failure or fault in the used computer program and thus can affect the efficacy of online psychotherapy (Griffiths, 2001; Mishna, Bogo, & Sawyer, 2013).

Problems with hardware are other issues which negatively impact on the effectiveness of online counselling interventions (Manhal-Baugus, 2001). The patients may be ill-equipped for interaction via Web devices, or connectivity may be poor causing delays in information transfer. Such technical barriers can be detrimental to developing a strong therapeutic alliance (Sucula, Schnur, Brackman, Constantino, & Montgomery, 2013). Fortney, Burgess, Bosworth, Booth, and Kaboli (2011) note further that data quality may impede effective counselling. For example, a low bandwidth network will provide low fidelity video and audio information and slow upload and download (Bennett & Glasgow, 2009; Meropol et al., 2011; Smith, Bensink, Armfield, Stillman, & Cattery, 2005). Similarly, low-resolution images can impede eye contact between the client and psychotherapist (Abbott et al., 2008). Abbott and colleagues (2008) also note that colour distortions can have a negative impact on videoconferencing sessions (Abbott et al., 2008). Parenthetically, the restrictive storage/memory and processing speeds of many smartphones could distort video images which can also interfere with the therapeutic alliance (Boulos, Wheeler, Tavares, & Jones, 2011).

A further issue is the lack of familiarity with technologies. Clients with little or no knowledge of computers may reject online psychotherapy out of a fear of the unknown, or they might be confused by the process (Mallen, Day, & Green, 2003). Therefore, cybertherapists must be able to help clients in solving software and technology questions. However, psychotherapists may also have low levels of computer literacy and therefore be less confident and, possibly, less effective in an online environment (Popoola & Adebowale, 2012). In text-based therapy, for instance, both parties need to be competent in conveying mental health problems and emotional states, and potentially applying emoticons (e.g., ☺️) appropriately to enhance emotional engagement (Abbott et al., 2008).

Ethical and legal issues should also be included in the list of potential challenges facing online therapy (Brenes, Ingram, & Danhauer, 2011; Gamble, Boyle, & Morris, 2015; Luxton, Pruitt, & Osenbach, 2014). These include privacy and security issues. A major ethical issue is that of confirming the identity of the client, particularly when it comes to text-based communication. Clinics or ‘lifelines’ require IT support personnel and a secure web portal to deliver efficient services by encrypting high-risk personal data of clients and preventing them from being hacked (i.e., avoiding the ability of third parties to access the client’s information). Other, related, issues include providing consent in the CMP
context (Jorm et al., 2013; Manhal-Baugus, 2001; Zack, Kraus, Stricker, & Speyer, 2010). Some argue that the identity of the therapist and client, their locations, and contact details for emergency purposes should be described in that consent form (Gamble et al., 2015). Further, some scholars maintain that it will be difficult to police practitioners’ competence in computer-mediated environments (Reamer, 2013) and that accrediting bodies will have difficulty ensuring that psychotherapists are competent in delivering psychotherapy online (Chester & Glass, 2006). Therefore, the details of services provided and qualification of therapists have to be mentioned in the consent form (Jorm et al., 2013) and that accrediting bodies will have difficulty ensuring that psychotherapists are competent in delivering psychotherapy online (Chester & Glass, 2006). Therefore, the details of services provided and qualification of therapists have to be mentioned in the consent form and signed electronically or in conjunction with a hard copy. Similarly, fee arrangements to charge clients’ for providing online healthcare and the health care coverage by health insurance companies should be discussed by authorities. In addition, a cybertherapist should be aware of cyber law to protect the clients’ privacy and confidentiality. Given the number of potential ethical concerns, clear guidelines should be developed (Gholami-Kordkheili, Wild, & Strech, 2013; Grajales III, Sheps, Ho, Novak-Lauscher, & Eysenbach, 2014; Kramer, Mishkind, Luxton, & Shore, 2013). Table 1 outlines the general advantages

<table>
<thead>
<tr>
<th>Advantages of Virtual Counselling</th>
<th>Disadvantages of Virtual Counselling</th>
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</thead>
<tbody>
<tr>
<td>Privacy</td>
<td>Feeling of being rushed</td>
</tr>
<tr>
<td>Anonymity from family, friends and coworkers</td>
<td>Time gap in response between client and psychotherapist during e-mail therapy</td>
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<tr>
<td>Emotionally safe environment</td>
<td>Feeling of not being valued</td>
</tr>
<tr>
<td>Empowerment; equal relationship with clinician</td>
<td>Difficulty in expressing emotions through text-based communication</td>
</tr>
<tr>
<td>Protection from negative counsellor emotions, such as boredom or criticism</td>
<td>Lack of emotional connection, rapport, and empathy</td>
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<tr>
<td>Convenience/Access</td>
<td>Experiencing a reduction of intimacy, trust, and commitment</td>
</tr>
<tr>
<td>Cost effectiveness / Affordability</td>
<td>Lack of privacy</td>
</tr>
<tr>
<td>Controllability of relationship and therapy</td>
<td>Lack of security and confidentiality</td>
</tr>
<tr>
<td>Greater ease with self-disclosing; less awkward and intimidating than face-to-face counselling</td>
<td>Stigma; Concerns about being caught by spouse or employer</td>
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<tr>
<td>Disinhibition/freedom to express themselves without embarrassment or fear of judgment from clinicians</td>
<td>Problems with the technology (malfunctions, glitches, and hardware failures)</td>
</tr>
<tr>
<td>Ability to be completely honest and open</td>
<td>Sense of loss from not having nonverbal cues or the personal warmth received from face-to-face contact</td>
</tr>
<tr>
<td>Responsiveness to clients needs during all clinical interaction</td>
<td>Absence of verbal and nonverbal cues (facial expressions, vocal signals or body language)</td>
</tr>
<tr>
<td>Various ways to communicate (e.g., telephone or email)</td>
<td>Lack of effectiveness/ clinical efficacy</td>
</tr>
<tr>
<td>Avoiding social stigma</td>
<td>Inaccessibility of ICT resources and knowledge; technical abilities of the participants</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Clinicians’ Credibility</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Clinicians’ lack of training</td>
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<tr>
<td>Time delay for review, evaluation and decision making of therapeutic communication</td>
<td>Legal and Ethical issues</td>
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<tr>
<td>Fewer unnecessary transfers and relocation of one or both counselling parties</td>
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<td>Re-readability of materials</td>
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<td>Services to remote area</td>
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and disadvantages in psychotherapy via technology. The primary content of this table is adapted from Robinson (2009a), Shiller (2009) and Centore (2006).

**STAND-ALONE PLATFORMS**

Stand-alone platforms are alternatives that can provide simultaneous, automated counselling. These tools aim to provide clients with the ability to identify their problematic thoughts, emotions, and behaviours without the help of a psychotherapist. In other words, they are online, open-access programs that have been designed to provide an individual with the ability to self-diagnose.

In Australia, MoodGYM and E-Couch are the most well-known of these technologies (Klein & Cook, 2010; Klein et al., 2014). They have been developed by the Centre for Mental Health Research at the Australian National University. Addressing the question of design, the current technologies are self-tailored treatment programs based on computational models of psychotherapy. MoodGYM, for example, was coded to provide a computer-based version of Cognitive Behaviour Therapy (CBT) with five modules including an interactive game, anxiety and depression assessments, downloadable audio-based relaxation files, a workbook, and feedback based on the assessments, each of which is thought to assist the client in the self-treatment of their issue. Similarly, E-Couch is an internet-delivered, psychotherapy platform. It provides therapy for depression, generalised anxiety, social anxiety, relationship breakdowns, and loss and grief based on a CBT method. Outside Australia, PAXonline was introduced in 2010 as a web-based platform to prevent and treat anxiety disorders in the Romanian population (Miclea, Miclea, Ciucu, & Budau, 2010). Other notable platforms available globally are Beating the Blue, Down Your Drink or Fear Fighter, Living Life To the Full, Beating Bipolar, Blues Begone, Mood Control, Coping Tutor, Good Days Ahead, and ODIN.

Along with the increase in number of stand-alone therapies, the issue relating to their applicability is an ongoing debate in psychotherapy research. On the positive side, there are suggestions that the consistent positive outcomes of these therapies might, one day, lead to the replacement of human therapists (Foroushani, Schneider, & Assareh, 2011; Green & Iverson, 2009; Kaltenthaler, Parry, Beverley, & Ferriter, 2008). Other are more modest and claim that current stand-alone platforms are ‘acceptable’ in treating clients’ mental disorders (Cavanagh & Shapiro, 2004; Marks, Cavanagh, & Gega, 2007) and have the benefit of cost effectiveness and accessibility to clients. Others have argued that the algorithm-based responses to psychological problems of stand-alone platforms are questionable (Christensen, Griffiths, & Farrer, 2009; Tantam, 2006). This has been supported by the dropout rates for computerized self-counselling services (Marks et al., 2007). For example, a recent study showed that a large proportion of clients (74%) assigned to MoodGYM psychotherapy dropped out (Donker et al., 2013). The same study reported that only 31.8% of participants finished half or more of the MoodGYM program. This rate is similar to that reported in earlier studies (Cavanagh & Shapiro, 2004; Clarke et al., 2005; Clarke et al., 2002; O’Kearney, Kang, Christensen, & Griffiths, 2009; Proudfoot et al., 2004), and hint at the possibility that people become frustrated or disenfranchised by stand-alone platforms.

Other, seemingly, important issues include the fact the stand-alone platforms cannot offer an effective therapeutic alliance between the clinician and client (Peck, 2010). Algorithmic programs are limited to one-way communication, although multimedia may add some human-like interactions. Further, these programs have a mechanistic design that impedes engagement between the user and the program. Besides the ‘click and read’ style of interaction, the programs incorporate only procedural and solid therapeutic interventions. They provide programmed therapeutic tasks for the clients to run in a predetermined order, which might not be followed or might become monotonous causing the client to quit the therapy. Therefore, although the effectiveness of these platforms seems strong and promising, therapist-client relationships should be considered in evaluation because that relationship is an important factor in transmitting therapeutic activities (Peck, 2010). This online transmission
might be improved by investigating how psychotherapists act and develop reliable and valid therapeutic factors (Bachelor & Horvath, 1999).

Mobile Applications

Mobile software applications (called apps) are another group of emerging technologies. They are programs designed to run operations for various purposes on a mobile device such as smartphones or tablets. Although they are in the early stages of production, an increasing number of these apps come from to health sector (Handel, 2011; Ventola, 2014). Specifically, psychotherapy-centred apps available for what are considered to be the primary emotions (e.g., sadness; Hogan & Kerin, 2012; Marks, 2013). The main goal of these apps is to allow users to explore their moods/emotions. ‘Emotion Sense’, for example, records the moods of the users by means of their voice patterns or collects emotional data from text messages (Fox & Duggan, 2012; Sciences, 2013). This enables people to get an insight into their moods over a certain period of time.

However, these apps are not limited to recording and collecting data about people’s emotional states. They contain a variety of strategies to assist individuals with therapy. These tools not only improve the accessibility of mental health care services beyond the clinic, but also enhance the efficiency of traditional care by providing coaching or self-help services (e.g., behaviour change management). FOCUS, for example, is a smartphone app that was developed to assist people with schizophrenia by helping them to self-manage their condition; interestingly, FOCUS has a high rate of acceptability and efficacy (Ben-Zeev et al., 2014). Other apps are based on psychological treatment methods such as Cognitive Behavioural Therapy (CBT) (e.g., eCBT, Calm³) or Dialectical Behaviour Therapy (DBT) (e.g., DBT Diary Card, Skills Coach¹⁰). These apps are designed to help people with anxiety, stress, depression and bipolar disorders.

Some mental health mobile apps attempt to conduct part of the therapeutic process. They collect statistics for the psychometric and diagnostic analyses of individuals, and have been designed for educational purposes (East & Havard, 2015). They aim to assess the wellbeing of clients and suggest possible therapeutic interventions. These technologies also enable clients to share relevant data with counsellors so that the health care professional can monitor the client’s progress. NeuroAssess¹¹, launched in July 2013, is an example of this type of app. NeuroAssess captures information about a client’s psychopathology and, using an automatic algorithm, measures the suicidal ideation of the client.

Psychology-centred applications are very useful portable programs, but they have limitations. They are similar to stand-alone platforms in that they are basically designed for one-way interaction, although there are some exceptions (see Luxton, McCann, Bush, Mishkind, and Reger (2011, p. 506). More importantly, their adequacy as therapeutic tools for serious psychological disorders is questionable. These apps generally assess, monitor, and track the intensity levels of factors (e.g., heart rate) associated with a small number of disorders (e.g., stress, anxiety, and sleep disorders) – ‘Depressioncheck’, for example, is an iPhone-based app of this range.

It is evident, therefore, that these tools do not provide clients with care as complex and complete as that received in face-to-face sessions. This has been noted by de Alva, Wadley, and Lederman (2015) who report dissatisfaction with applications when compared with face-to-face interventions. The participants in this study revealed that app-oriented health-tasks such as working and studying provided less support for them to deal with their life situations and reduce anxiety. It was also reported that the apps did not assist users in understanding, dealing with, or managing the real life activities of a person with mental problems.

Another limitation is associated with the recording of online and offline information relating to clients'/users’ behaviours. Although the recorded/stored data enables mental health practitioners to track a user’s mood and mental state, the recorded information may not be reliable due to the calibration of the sensors or devices. Similarly, problems might arise if the apps interpret this data in
place of a clinician. They might generate a generic interpretation without considering the subtleties that a clinician might deem important.

Additionally, and much like stand-alone platforms, there is the problem of protecting personal data (Luxton et al., 2011). The apps might not have been created by ethical and creditable organisations and it is possible that many non-accredited or open source apps may not have the client’s best interests at heart. Not all apps are developed by authorized centres, such as ‘PTSD Coach’ developed by the USA’s Department of Veterans’ Affairs which is dependable in terms of privacy, safety, and accuracy of functioning.

Automated Self-Help Services

Other programs at the intersection of technology and mental health care are the fully automated self-help systems. Historically, debates concerning the automatized therapy date back to the 1960s with the development of ‘ELIZA’ (see Weizenbaum (1966)), and ‘PlatoDoc’ and ‘MORTAN’ which went live as automated therapy programs in the 1980s, or ‘Dear Uncle Ezra’ created in 1986 as the first web-based help service advising students at Cornell University. Based on the principles of cognitive therapy, these systems were designed to help people make decisions regarding their mental health; they were specifically designed to help clients’ moderate the symptoms of depression (Granello, 2000; Selmi, Klein, Greist, Johnson, & Harris, 1982; Wagman & Kerber, 1984). It was expected at this time that artificial intelligence (AI) would replace human-to-human therapeutic interaction with a human-independent computerized environment. However, the developed programs were not successful.

With respect to technical and treatment history, debate regarding the possibility of automated psychotherapy can be generally placed at one (or the other) end of a spectrum. On one end is the full automatization of therapy. This is justified with the progress in technology and high level artificial intelligence becoming more like face-to-face therapy (Block, 2009; Newell & Simon, 1963; Turing, 1950). With this scenario, the computer becomes the psychotherapist with full treatment strategies. That said, automated therapists will require extensive databases of therapeutic and clinical knowledge, natural language processing, affective computing ability to calculate mental states via machine learning algorithms (Luxton, 2015). With current data-driven methods that are capable of mimicking, understanding and assisting animated and artificial information processing, proponents of this strong position cite successes in areas such as automated agents and avatars in virtual environments where it is claimed that disorders such as PTSD have been successfully treated (Reger, Rizzo, & Gahm, 2015).

At the other end of the spectrum is the idea that the best we can hope for are technologies that enhance communication between individuals. This weak view argues against fully automated therapy because of moral and ethical issues and technical and physical limitations such as memory capacity, low-level sensorimotor skills, and limited ability in affective and language processing (Dreyfus & Dreyfus, 2000; Dreyfus, 1992; Searle, 1992). Proponents of this view believe that automated therapists have failed in the past and will continue to fail because they cannot match a human therapist’s capabilities, and have not passed the Turing test (Luxton, 2015; Saygin, Cicekli, & Akman, 2003). It was also the view of the designer of ELIZA that important decisions cannot and should not be expected by computerized systems because these technologies equipped with AI techniques lack the human’s cognitive qualities such as empathy and perception (Weizenbaum, 1966). In other words, because theory of mind is an essential component of humans’ interactions with one another, automated psychotherapy is unlikely to succeed until artificial agents become self-aware (Vardi, 2014). If this proves to be the case, should intelligent telecommunication applications and the intelligent technologies be put aside or can they be consolidated into new premises?

VIRTUAL REALITY

The 2D space of video-based technologies is fundamentally different from the usual, three-dimensional experience of in-person therapy (Manstead et al., 2011). Some of the drawbacks of 2D spaces are that
the movements of therapy pairs (consultant and consultee) are limited relative to one another. Thus, Second Life technologies and other online virtual realities (VR)\textsuperscript{13} have been introduced as ways of overcoming the negative influences of limited movement in 2D space.

There are different motivations that drive the widespread adoption of VR in psychotherapy. One has been the need for the collection of better information at the point of mental health servicing. To enable this, counsellors can provide stimuli to clients in virtual environments (VEs) that are similar to those in the real world (Clough & Casey, 2011). Threatening situations can be introduced safely on role-plays in VR using simulated avatars, easing the therapeutic process (Carey, 2010). That is, dangerous situations can be avoided as during the treatment of some phobias, allowing the fear to be attenuated (Riva, 2005). Virtual environments also simulate the triggers of social anxiety and provide opportunities to practise social interactions safely (Gaggioli, Gorini, & Riva, 2007) and, be observed unobtrusively by the clinician (Nagel & Anthony, 2011). The client and clinician can both use avatars to express mental problems verbally and mimic behavioural cues, while allowing the client to remain anonymous and reducing the stigma associated with psychological concerns (Quackenbush & Krasner, 2012). Virtual Reality also offers a rich medium for training and helping counsellors (Székely & Satava, 1999). Cybertherapists can practise and improve their skills by way of virtualized scenarios, clients, and clinical settings (Bennett-Levy & Perry, 2009; Kenny, Parsons, Gratch, Leuski, & Rizzo, 2007; Parsons, Buckwalter, Lange, & Kenny, 2014; Rizzo, D.Parsons, Kenny, & Buckwalter, 2012).

In light of these advantages, it is no surprise that VR is becoming increasing prevalent in therapy and is being employed by some psychotherapists (Gaggioli & Riva, 2007; Good, Gnanayutham, Sambhanthan, & Paniganj, 2013; Gregg & Terrer, 2007; Riva, 2003; Riva, Wiederhold, & Molinari, 1998; Russ, 2012; Välimäki et al., 2012). For example, video games are being trialled as therapeutic tools in the treatment of autistic children (Fernández-Aranda et al., 2012). ‘PlayMancer’ is an example of a collaborative VE developed for the treatment of specific mental health issues (e.g., eating disorders) and pain rehabilitation\textsuperscript{14} (Jiménez-Murcia et al., 2009). The authors of the game have found that patients with Impulse Control Disorder (ICD) felt comfortable using such a video game; participants’ physiological and emotional reactions were attenuated by means of the reduction in their stress level. PlayMancer had also helped people with eating disorders and pain rehabilitation (Jiménez-Murcia et al., 2009). The game Pico’s Adventures is another Kinect-based game which was employed to promote social initiation in children with Autism Spectrum Disorder (ASD; Malinverni et al., 2016). The early findings from field observations and video analysis have shown that children with ASD accepted the game positively and developed their social behaviours.

‘Pesky Nates!!!’ is a similar program that uses gaming technology. It is based on CBT and is aimed at helping children with anxiety and depression\textsuperscript{15}. Other developments including ‘SimCoach’, ‘Virtual Justina’, ‘Bravemind’, and ‘STRIVE’ are virtual reality platforms that create life-like characters and realistic environments to provide therapeutic help. ‘SimCoach’, for instance, has been developed to assist military personnel and their families to alleviate mental health issues, trauma, and addiction issues (Rizzo, Forbell, et al., 2012). This prototype also assists with other issues such as the welfare of, and the economic stress on, military families. ‘Virtual Justina’ is another prototype designed for patients with Post Traumatic Stress Disorder (PTSD) (Kenny, Parsons, Gratch, & Rizzo, 2008). Here, real dialogue (between a patient and a clinician) is conducted between avatars (Rizzo, D.Parsons, et al., 2012). ‘Virtual Justina’ is also being used as a virtual medium to train psychotherapists. The trainee can either communicate with real clients via virtual mediums or apply therapeutic principles to virtual patients (Kenny, Parsons, Pataki, et al., 2008; Kenny et al., 2007).

Although virtual environments hold substantial promise, there are some challenges facing psychotherapy using VR. Complex input and output devices and the graphics and animations of VEs need to be more sophisticated to more closely simulate real clinical spaces. Also, virtual worlds need to be realistic for treating disorders such phobias (Kenny et al., 2007). These design challenges continue in spite of considerable advances in simulation. For example, avatars used in VR clinics or hospitals need to simulate more than the human body. Avatars need to be equipped with human-like
facial expressions and behavioural mannerisms which are taken for granted in face-to-face therapy sessions. Parenthetically, there is also the issue of the ‘uncanny valley’ whereby virtual people too closely mimic ‘real’ people causing disquiet or revulsion among users (see, for example, Mori, MacDorman, & Kageki, 2012; Morie, 2008; Nowak, 2015). Currently, some pilot studies have employed virtual reality equipment in treating mental disorders such as Complex Regional Pain Syndrome (CRPS) (Won et al., 2015) and social phobia (Gebara, Barros-Neto, Gertsenchtein, & Lotufo-Neto, 2016). From a clinical viewpoint, although the technologies have had positive impacts on the participants’ psychological states, the virtual experience of objects, movements such as body language of others and the perception of clients’ presence is not still satisfiable. It is expected that the development of virtual reality headsets and glasses such as Oculus Rift\textsuperscript{16} may help to solve these issues (see Chang, Liu, Kang, Kao, & Chang, 2016). It is also expected that holographic telepresence be employed in psychotherapy as it can provide a live full-motion of remote users by three-dimensional (3D) videoconferencing (Hu, Baldwin, Niederberger, & Fattal, 2015). The technology will enable counselling pairs to communicate as natural as face-to-face by reconstructing, compressing and transmitting their models anywhere in the world in real time.

**ASSISTANT PSYCHOTHERAPISTS**

Although “immersive virtual environment(s) offer new possibilities for therapy, for example by providing realistic but not actual exposure” (Tantam, 2006, p. 419), fully automated psychotherapy is not currently possible. A significant part of this difficulty is replication of the relationship that clients form with their therapists (Duggan, 2016). Consequently, several researchers have suggested that automated psychotherapeutic systems might be better suited to acting as ‘illusory therapist[s]’ (Helgadóttir, Menzies, Onslow, Packman, & O’Brian, 2009a, p. 251), ‘Virtual Consumer Consultant[s]’ (Griffiths, 2013) or assistant therapists who enhance interactions between counselling pairs. That is, the assistant therapist acts as a coach (rather a therapist) and is equipped with self-management programs to help organise, process and progress treatment. It is proposed that assistant therapists might increase a cybertherapist’s understanding of a client’s mental health issues, reduce recovery time, and improve the quality of treatment (Bauer & Moessner, 2012; Howell & Muller, 2000). Assistant therapist programs can also be equipped with the technology to gather bio-sensory, behavioural, speech and/or neural data from clients to assist with correct diagnosis and therapeutic intervention (Griffiths, 2013).

There have been several assistant therapists developed that have achieved some level of success in regulating moods and attenuating depression (Both & Hoogendoorn, 2011; Both, Hoogendoorn, Klein, & Treur, 2010; Helgadóttir, Menzies, Onslow, Packman, & O’Brian, 2009b). However, and consistent with other cybertherapy tools, there are some concerns associated with assistant therapist technologies. Firstly, these technologies must be user-friendly and secure with any data kept confidential (Green & Iverson, 2009). Secondly, evidence of the validity and efficacy of the data collected is currently lacking. Further, assistant therapist technologies cannot provide corrective feedback to clients’ responses (Helgadóttir et al., 2009a) and, as such, this may contribute to program dropout. To overcome this limitation, Helgadóttir et al. (2009a) suggest that client engagement should be increased in some way. They suggest providing a reminder service (e.g., reminder emails) to users, or designing task-relevant deadlines. Interestingly, the latter approach received positive feedback from clients in a study by Klein and Richards (2001). They specified time-limited access for clients in their online treatment program, and only one person in their trial dropped out.

While there is positive evidence for automated therapy (see, for example, Helgadóttir, Menzies, Onslow, Packman, & O’Brian, 2014), none of the current online ‘assistant therapist’ platforms adequately address all of the criteria necessary for successful online psychotherapy. Similar to stand-alone and automated therapists, it seems that the therapeutic alliance generated via online assistant therapists still lacks the productive personal connection between the clinician and client. Specifically,
the emotional engagement present in face-to-face therapy is impaired via computerized systems (Reynolds, Stiles, Bailer, & Hughes, 2013; Reynolds JR, Stiles, & Grohol, 2006). Furthermore, diagnosing disorders becomes difficult because of the lack of non-verbal and/or behavioural cues (Li, Jaladin, & Abdullah, 2013). Moreover, Bambling (2008) claims that the lack of non-verbal cues reduces the emotional proximity and cognitive interaction between the clinician and client in online platforms and, consequently, client issues were often assessed inaccurately. Currently, with this technology, it is uncertain whether it is the client who has difficulty expressing their concerns or the psychotherapist who has difficulty identifying these concerns. It also remains unclear what impact technologies have on the clinician’s ability to empathise and on the eventual diagnosis. These questions point to the necessity for detailed investigations in this area.

CONCLUSION

Psychotherapy has used telecommunications technologies to deliver remote therapy for many years. In this review article, several forms of telecommunications technologies have been outlined. Initially, a short history of the telephone used in psychotherapy was provided. Then, it was demonstrated that later advancements including the Internet, text-messaging services, and videoconferencing systems created new possibilities for remote therapy. While a large number of services via these technologies have demonstrated positive outcomes, the therapeutic experience itself remains of concern. The therapeutic relationship during technology-based sessions might be influenced due to compromised clinical, technical and ethical factors.

The article also described the expanding area of computerized systems employed in psychotherapy. It was revealed that some of the mental health issues (e.g., phobias, bulimia) had been treated effectively by using virtual therapy programs. However, although several stand-alone platforms and computerized therapists appear promising, it has been argued that the most promising use of online and virtual therapy programs is data gathering to compliment treatments of a ‘real’ psychotherapist. The suggestion is not that computerized systems are less effective, but that they should not be dismissed by providers and designers of online healthcare programs. The validating and evaluating of human-like relationships, and particularly those between counsellors and clients, is needed to ensure best-practice in simulated environments.

The future of the profession, particularly with reference to technological advancements which have shown substantial growth concerned with the video streaming quality, will be affected by the use of videoconferencing systems. It was discussed that these systems are most promising as they can allow the therapist and client to feel as if they were present in the clinic. Virtual reality can also be used as an alternative to a great extent by enhanced graphics and design of environments and devices. There is also an exciting voyage to the cutting edge of upcoming technologies such as mobile holographical telepresence that can offer clinicians, psychotherapists, and their clients a bit of different language. These people can experience psychotherapy session, as natural as face-to-face communication. However, other than the applicability and ethical frameworks, the main question that remains to be addressed is how this possibility will be provided to the community on a large scale and affordable.
REFERENCES


Swain, D. (2007). Can blogging be used to improve medication error collection as part of health informatics knowledge management. In *Creating collaborative advantage through knowledge and innovation* (pp. 301-313).


ENDNOTES

4. see: http://fftimes.com/node/262761
5. https://moodgym.anu.edu.au
6. https://ecouch.anu.edu.au
7. https://www.paxonline.ro
8. The links for these and similar programs can be found at: https://www.beacon.anu.edu.au/service/website/browse/1/Depression
12. Alan Turing (23 June, 1912 – 7 June, 1954) was a mathematician and philosopher who proposed a thought experiment whereby a machine would be considered intelligent if a person communicating with the machine was not able to discern that it was a machine. This imitation game is discussed as a basic theoretical and practical challenge for Artificial Intelligence (see Copeland, 2003; Turing, 1950)
13. VR is defined as “a collection of technologies that allow people to interact efficiently with 3D computerized databases in real time using their natural senses and skills” (McCloy & Stone, 2001, p. 912).
14. See for more information: http://www.playmancer.eu/
15. See for more information: http://www.PeskyGnats.com/

Ebrahim Oshni Alvandi has a PhD degree in Applied Cognitive Sciences from Monash University. Ebrahim has worked on a cognitive model of emotional agency for telecounselling on his PhD studies. Computer-human interaction, cyber-psychology and engineering psychology have been the focus of his research goal. In particular, emotions that are transferred via computer-mediated communication have been the main targets of his research. Ebrahim also has received his Master of Science degree in Philosophy of Science and Mind. In his Master degree, he has specialized in philosophy of cognitive sciences and artificial intelligence and developed a cognitive and informational modelling of emotions. Recently, Ebrahim works on computational methods and social robots for psychotherapy.

George Van Doorn’s main research interest is in exploring perception. He has conducted several experiments exploring how we perceive temperature via self- and externally-generated movements, how vision and touch work together in virtual reality, how colour and temperature interact (e.g., hot is associated with red), and the influence of colours on the perception of taste (e.g., work with Charles Spence on how the colour of the mug can influence the perception of the taste of coffee). Recently, George has merged his interest in touch with illusions – which are useful in that they can tell us about errors in perception, and thus about perception itself. George and colleagues recently generated a body-swapping illusion and had people either tickle themselves or be tickled by someone else, and much of his current work is devoted to exploring PEM by incorporating sensory integration, self- and externally-generated movements, and various illusions.

Mark Symmons’ fields of research interest include road safety, counselling psychology, haptics, and distance learning.