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Title: Efficacy of synchronous telepsychology interventions for people with anxiety, depression, posttraumatic stress disorder and adjustment disorder: A rapid evidence assessment

Short Title: Synchronous telepsychology interventions for anxiety, depression, PTSD and adjustment disorder

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Abstract

Telepsychology holds promise as a treatment delivery method that may increase access to services as well as reduce barriers to treatment accessibility. The aim of this rapid evidence assessment was to assess the evidence for synchronous telepsychology interventions for four common mental health conditions (depression, anxiety, posttraumatic stress disorder, and adjustment disorder). Randomised controlled trials published between 2005 and 2016 that investigated synchronous telepsychology (i.e., telephone-delivered, video-teleconference delivered, or internet-delivered text-based) were identified through literature searches. From an initial yield of 2266 studies, 24 were included in the review. Ten studies investigated the effectiveness of telephone-delivered interventions, 11 investigated the effectiveness of video-teleconference (VTC) interventions, two investigated internet-delivered text-based interventions; and two were reviews of multiple telepsychology modalities. There was sufficient evidence to support VTC and telephone-delivered interventions for mental health conditions. The evidence for synchronous internet-delivered text-based interventions was ranked as 'Unknown'. Telephone-delivered and VTC-delivered psychological interventions provide a mode of treatment delivery that can potentially overcome barriers and increase access to psychological interventions.

Keywords: telepsychology, internet-delivered text-based, telephone-delivered, video-teleconference, synchronous

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Efficacy of synchronous telepsychology interventions for people with anxiety, depression, posttraumatic stress disorder and adjustment disorder: A rapid evidence assessment

The use of information and communication technologies has emerged as the next big frontier in the efficient and effective delivery of healthcare. The term ‘telemedicine’ has been adopted to describe health care delivery via technology (Wilson & Maeder, 2015), including in mental health treatment delivery, where it is typically known as telepsychology.

Telepsychology, the delivery of psychological services via technology, is a broad field and encompasses various delivery modalities and formats (Nelson, Bui, & Velasquez, 2011). It needs to be distinguished from other forms of telemedicine, such as telepsychiatry, which further includes the delivery of psychopharmacological interventions via technology. The various delivery modalities and formats include the use of mobile phone technology (e.g., short message service (SMS) or application-based (app) interventions), telephone-delivered therapy, video teleconferencing, internet-delivered text-based therapy or treatment programs, and other formats such as using social media, or video games as adjuncts to therapy. While these delivery formats vary in their specifics, such as being self-directed, guided self-help, or real-time interaction with a specialist, all are accessible to individuals with internet and/or phone service and suitable equipment.

An important distinction in telepsychology is between ‘synchronous’ and ‘asynchronous’ delivery methods (Wilson & Maeder, 2015). Synchronous telepsychology refers to visual and/or auditory interactions between the client and provider that are in real-time and is therefore the most similar delivery format to traditional in-person treatment (Osenbach, O'Brien, Mishkind, & Smolenski, 2013). Synchronous interventions include telephone or video-teleconference delivered treatments and internet delivered text-based treatments that involve real-time text interactions (often referred to as ‘webchat’).

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Asynchronous telepsychology involves client-provider interactions which are not in real-time and thus includes interventions such as automated internet or computer based interventions or email interactions with providers (Substance Abuse and Mental Health Services Administration, 2015).

Telepsychology is of particular relevance in countries that face geographical challenges in delivering healthcare (Mehrotra et al., 2016). Research shows that increasing location remoteness was consistently associated with lower service use, and this relationship was particularly strong for specialist mental health interventions (Meadows, Enticott, Inder, Russell, & Gurr, 2015). There is even further restriction on the availability of providers who specialise in the treatment of particularly complex mental health conditions, such as posttraumatic stress disorder (PTSD), in regional and remote areas (Frueh, 2015; Riding-Malon & Werth Jr, 2014). Research suggests that common barriers to seeking or receiving mental health treatment in rural or remote areas include concerns about stigma (Wrigley, Jackson, Judd, & Komiti, 2005), geographical isolation, difficulty accessing appropriate transport, concerns about the cost of treatment, and perceived time commitment (Handley et al., 2014). Certain populations of treatment-seekers may be particularly vulnerable to perceptions of stigma relating to mental health, as well as being rurally located, such as veterans (Frueh, 2015). Accessing treatment via telepsychology may reduce concerns about stigma, with treatment available in the privacy of one's own home which provides flexibility and allows optimum use of client and therapist time (Rees & Haythornthwaite, 2004).

Evidence for the effectiveness of telepsychology has been emerging over the past decade. Systematic reviews that have combined both types of telepsychology, i.e. synchronous and non-synchronous, indicate that telepsychology is generally effective (Backhaus et al., 2012). However, previous reviews have included several different telepsychology modalities, with internet-based, computer-based, telephone-based, and video-

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based included together without examining or commenting on the difference between synchronous and non-synchronous treatments. Synchronous treatment is the most similar treatment to traditional psychological treatments and therefore seems to be the logical place to start, to further our understanding of telepsychology. Common types of synchronous treatment include telephone delivered, video-teleconferencing delivered, and internet-delivered text-based modalities. It has been noted in the literature that these heterogeneous modalities are commonly grouped together (Osenbach et al., 2013), however it is important to distinguish explore whether there is differential evidence supporting each of these modalities. There has only been one previous systematic literature review which has focused specifically on synchronous telepsychology for the treatment of depression (Osenbach et al., 2013), and it concluded that it was as effective as non-telehealth means in reducing depression symptoms. In comparison, there are no literature reviews which have assessed the evidence in relation to synchronous telepsychology for other common mental health conditions such as anxiety, PTSD and adjustment disorder. It is important to develop an understanding of how effective synchronous telepsychology is likely to be for these disorders, as people experiencing these disorders are often geographically isolated, experiencing stigma, or experiencing physical injury. Another common mental health problem, substance abuse, has been the subject of several telepsychology reviews over the past few years (e.g. Benavides-Vaello, Strode, & Sheeran, 2013; Young, 2012), and as such will not be examined in the current review.

The aim of this review is to determine the efficacy of synchronous telepsychology for the treatment of three common mental health disorders (anxiety, PTSD, and adjustment disorder) that have not yet been investigated through systematic review, in addition to updating the literature on synchronous telepsychology for the treatment of depression beyond the findings from Osenbach and colleagues (Osenbach et al., 2013). Given that the study

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focus is heterogeneous in respect to modality (all forms of synchronous telepsychology) and disorder (anxiety, PTSD, adjustment disorder, and depression), and given that telepsychology is a rapidly developing field, it is well-suited to a rapid evidence assessment (REA) approach as opposed to a systematic review.

Methods

This study utilised a REA methodology, which is a rigorous process that avoids a number of the challenges that face a systematic review, such as the time and resource cost (Crawford, Boyd, Jain, Khorsan, & Jonas, 2015; Varker et al., 2015). The key limitations of an REA methodology come from the restricted search period, and the exclusion of unpublished, difficult-to-obtain, and/or foreign language studies (Varker et al., 2015). The steps of an REA methodology are outlined below.

Defining the question

The first stage of the REA is defining the population, intervention, comparison and outcome (PICO), in the same manner as a systematic review (Crawford et al., 2015). The population of interest was defined as adults with a diagnosis of depression, anxiety, PTSD, or adjustment disorder (ascertained by diagnosis or cut off score on a validated measure). The intervention was defined as any psychological intervention delivered using synchronous telepsychology. The comparison included studies with treatment as usual, in-person treatments, or alternative telepsychology intervention comparisons. The outcome was defined as change in mental health symptom severity.

Search strategy

Medline, PsycINFO and the Cochrane library were searched for peer-reviewed literature published from January 2005 to July 2016. Each database was single searched using the title/s, abstract/s, MeSH terms, and Keywords lists with search terms specific to

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telepsychology, common mental health conditions (i.e. depression, PTSD, adjustment disorder and anxiety) and study type. The interventions that were searched for were those that are typically used in the treatment of depression, PTSD, adjustment disorder and anxiety. The following search terms were used: “major depressive disorder” OR depression OR PTSD OR “posttraumatic stress” OR “post-traumatic stress” OR “traumatic stress” OR “stress disorder” OR anxiety OR “GAD” OR “generalized anxiety disorder” OR “anxiety disorder” OR phobia OR panic OR “adjustment disorder” AND “cognitive behavioural therapy” OR “cognitive behavioral therapy” OR CBT OR “cognitive processing therapy” OR “cognitive therapy” OR “dialectical behaviour therapy” OR “dialectical behavior therapy” OR “behaviour therapy” OR “behavior therapy” OR exposure OR “imaginal exposure” OR “in vivo exposure” OR “motivational interviewing” OR “acceptance and commitment therapy” OR “mindfulness” OR “schema therapy” OR “interpersonal therapy” OR EMDR OR “eye movement desensitization and reprocessing” OR “narrative therapy” OR “solution focused therapy” OR “solution focussed therapy” OR “psychiatric consultation” OR therapy OR treatment OR counselling OR intervention AND telepsychology, OR telemedicine, OR e-health, OR telehealth, OR telephone, OR “mobile phone” OR video, OR videoconferencing, OR skype, OR face-time, OR internet, OR online, OR web, OR web-based, OR internet-based OR internet-delivered OR telephone-based OR telephone-delivered OR web-delivered AND “systematic review” OR “meta-analysis” OR RCT OR “randomized controlled trial” OR “control trial” OR “effectiveness trial” OR “control study” OR “clinical trial”.

Study selection

Studies were included if they were published in English, were peer-reviewed meta-analyses, systematic reviews or randomised controlled trials (RCTs), involved adults (≥ 18 years of age), used psychological interventions delivered by synchronous telepsychology, included participants with a diagnosis or cut-off score indicating an anxiety disorder, major

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depressive disorder, PTSD, or adjustment disorder, and where trial outcomes included mental health symptom severity. Studies were excluded where asynchronous telepsychology modalities were used. One author (RB) initially screened the studies based on title and abstract and obtained the full-text papers that satisfied the inclusion criteria. The full-text papers were then screened for inclusion, with 10% of these randomly selected and checked by a second author (TV) for agreement. This meant that these papers were reviewed by the second author for eligibility as per the inclusion/exclusion criteria. Of this 10% checked by both reviewers, there was 100% inter-rater agreement. Any disagreements between reviewers would have been resolved by discussion, or through adjudication by a third author (AP). If a meta-analysis selected for inclusion in the REA included a study that was also found as an independent article, then the individual study was not included or counted for the purposes of the current review, and was only reported on as part of the meta-analysis.

Quality assessment

The quality of included research studies was appraised using the criteria from the Australian National Health and Medical Research Council (NHMRC) checklist (NHMRC, 1999), which considers the following four study features: the method of treatment assignment (i.e., correct blinding and randomization); control of selection bias (i.e. intention to treat and drop-out rate); blinding of outcome assessor; and whether standardized assessment was used. The quality of systematic reviews and meta-analyses were assessed using National Health and Medical Research Council quality criteria (NHMRC, 2000), which considers the adequacy of the search strategy; appropriateness of the inclusion criteria; presence of quality assessment for individual studies; summary of the results of individual studies; and quantitative synthesis of results (where relevant). An overall rating of the quality of each study is provided in Table 2. The results of these quality assessments were then used to inform the overall strength of the evidence.

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Ranking the overall evidence

The evidence was evaluated using five criteria (Merlin, Weston, & Tooher, 2009): the **strength of the evidence**, in terms of the quality, quantity, and design of the included studies; the **direction** of the findings; the **consistency** of the findings across the included studies (including across a range of study populations and study designs); and the **generalizability** (of the body of evidence to the target population) **and applicability** of the findings to the population of interest, as defined by the PICO. Three independent raters (RB, TV and JW) made ratings about the strength of the evidence, direction of the findings, consistency of the findings, generalizability and applicability. Strength of the evidence was based on the following categories: high strength, where there is one or more systematic review or meta-analysis of RCTs with a low risk of bias (i.e. risk of there being a systematic error in the results, which can lead to underestimation or overestimation of the true intervention effect) or three or more RCTs with a low risk of bias; moderate strength, where there is one or two RCTs with a low risk of bias; and low strength, where there is one or more RCT with a high risk of bias. The direction of the findings were judged in terms of whether the weight of the evidence showed positive results, unclear results (i.e. no significant effects or mixed results), or negative results. Further details on the methods for making each of these judgments for each of the five criteria are detailed in Varker et al (2015).

The strength of the evidence, the direction of the findings, and the consistency of the findings reflect the internal validity of the findings in support of efficacy for an intervention. The last two components considered the external factors that may influence effectiveness. On the basis of these five factors, the total body of the evidence was then ranked into one of four categories: 'Supported', 'Promising', 'Unknown' and 'Not Supported'. A ranking of 'Supported' means that there is clear, consistent evidence of a beneficial effect with no evidence suggesting a negative or harmful effect, 'Promising' means that the evidence is

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suggestive of beneficial effect but further information is required. An 'Unknown' ranking means that there is insufficient evidence of beneficial effect and further research is required, and 'not supported' means there is clear, consistent evidence of no effect or negative/harmful effect (Varker et al., 2015). Agreement on ranking was sought between three independent raters (TV, RB, JW), with 100% inter-rater agreement found. Discrepancies between the raters would have been resolved through discussion.

Results

Figure 1 shows the yield at all stages of the review. After removing duplicate articles from an initial yield of 2266 articles, 2196 articles were screened on title and abstract and 206 were deemed eligible for full text review. After the full text review stage, 24 articles were deemed eligible for inclusion. Given the relatively small number of articles identified in the REA, the studies were grouped by telepsychology modality to provide the most meaningful results possible, regardless of the mental health disorder addressed in the study.

Of the 24 articles included in the review: eight studies (Brenes, Danhauer, Lyles, Hogan, & Miller, 2015; Dwight-Johnson et al., 2011; Gellis, Kenaley, & Have, 2014; Lovell et al., 2006; Ludman, Simon, Tutty, & Von Korff, 2007; Mohr, Carmody, Erickson, Jin, & Leader, 2011; Mohr et al., 2005; Mohr et al., 2012) and one meta-analysis (Mohr, Vella, Hart, Heckman, & Simon, 2008) investigated the effectiveness of telephone-delivered interventions for depression; 10 studies (Acierno et al., 2016; Choi et al., 2014; Egede et al., 2015; Fortney et al., 2015; Morland et al., 2014; Morland et al., 2015; Stubbings, Rees, Roberts, & Kane, 2013; Vogel et al., 2014; Yuen et al., 2015; Ziemba et al., 2014) and one systematic review which included 20 studies (Rees & Maclaine, 2015), investigated the effectiveness of video-conference delivered interventions for anxiety disorders; two further studies investigated internet-delivered text-based interventions; and one meta-analysis

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(Osenbach et al., 2013) investigated the effectiveness of multiple telepsychology modalities in the treatment of depression, while another meta-analysis investigated the effectiveness of multiple telepsychology modalities in the treatment of mood or functional mental health problems (Bee et al., 2008). The majority of the studies were conducted in the USA ($n = 15$), with studies also conducted in Europe ($n = 4$) and Australia ($n = 1$). A summary of the key characteristics of the included studies are described below and are presented in Table 1. The overall findings for each intervention type are presented below and in Table 2.

Telephone-delivered interventions: Overall, 11 studies investigated the effectiveness of telephone-delivered psychological interventions. Two meta-analyses looked at a range of telepsychology modalities including telephone-delivered therapy (Bee et al., 2008; Osenbach et al., 2013) while a third meta-analysis looked specifically at telephone-delivered psychotherapy for depression (Mohr et al., 2008). Eight individual RCTs assessed telephone-delivered therapy for a range of disorders (i.e. generalized anxiety disorder, depression, and obsessive compulsive disorder), with treatment as usual comparisons (Dwight-Johnson et al., 2011; Gellis et al., 2014; Ludman et al., 2007; Mohr et al., 2011) in-person therapy comparisons (Lovell et al., 2006; Mohr et al., 2012), and telepsychology comparisons (Brenes et al., 2015; Mohr et al., 2005).

Overall, the strength of the evidence for telephone-delivered therapy was rated as high, given that there were three meta-analyses, one of which had low risk of bias (Bee et al., 2008) and two of which had moderate risk of bias (Mohr et al., 2008; Osenbach et al., 2013) which had results supporting the use of telephone-delivered therapy. In addition to this there were several other high quality individual RCTs (Brenes et al., 2015; Dwight-Johnson et al., 2011; Gellis et al., 2014; Lovell et al., 2006; Ludman et al., 2007; Mohr et al., 2011; Mohr et al., 2012). The direction of the evidence was judged to be positive, since all studies except for one, reported that telephone-delivered therapy was as effective as standard in-person

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treatment or was better than TAU on a range of outcomes. One study did not find a significant difference in improvement between T-CBT and TAU groups (Mohr et al., 2011), but given the strong positive weight of the rest of the evidence, this finding was judged not to be significant enough to lower the direction rating to 'Unclear'. The consistency of the findings was judged to be moderate to high, as the majority of studies reported similar trends in the findings, with telephone-delivered therapy being as effective as TAU or standard in-person treatments. Specifically, T-CBT was found to be as effective as in-person treatments in non-inferiority trials (i.e. trials comparing a novel treatment to an existing standard treatment), but was found to be superior to TAU. Given that the majority of studies were consistent in their findings, it was determined that these results are highly likely to be replicable. The generalizability of these studies was rated as moderate to high, as the studies included a range of disorders and samples. The applicability of these findings was judged to be high, as the treatments and delivery formats are highly relevant and applicable to a western health system. Thus, given the high strength, positive direction, moderate to high consistency, moderate to high generalizability and high applicability, the use of telephone-delivered telepsychology for clients with mental health conditions was ranked as 'Supported'.

Video-conference delivered interventions: Twelve studies were identified that investigated the effectiveness of VTC-delivered interventions. One meta-analytic review looked at a range of telepsychology modalities, including VTC (Osenbach et al., 2013) one systematic review of VTC was identified (Rees & Maclaine, 2015) and ten individual RCTs were also found, all of which used in-person intervention comparisons (Acierno et al., 2016; Choi et al., 2014; Egede et al., 2015; Fortney et al., 2015; Morland et al., 2014; Morland et al., 2015; Stubbings et al., 2013; Vogel et al., 2014; Yuen et al., 2015; Ziembra et al., 2014), other than one study which used a self-help book on evidence-based exposure and response prevention or waitlist comparison (Vogel et al., 2014).

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Overall, the strength of the evidence base for VTC-delivered telepsychology interventions was rated as high. This rating was primarily based on the presence of five high quality RCTs with low risk of bias (Acierno et al., 2016; Egede et al., 2015; Fortney et al., 2015; Morland et al., 2014; Yuen et al., 2015). The remaining RCTs in the VTC literature yield were rated as being at moderate or high risk of bias due to methodological issues such as small sample sizes, high drop-outs (i.e. >25%) or lack of blinding of assessors (i.e. the assessors were aware of the treatment condition) (Choi et al., 2014; Morland et al., 2015; Stubbings et al., 2013; Vogel et al., 2014; Ziemba et al., 2014). The direction of the evidence was rated as positive, with all studies finding that VTC-delivered therapy had results showing it was as effective as in-person therapy and one study finding that VTC-delivered therapy was superior to using a self-help book on evidence-based exposure and response prevention, and a waitlist control (Vogel et al., 2014). The consistency was rated as high, as all studies were consistent in their findings. The generalizability of the evidence base was rated as moderate to high, with the samples in the studies representative of adults with mental health conditions. Of note however, six of the included studies focussed solely on US veteran populations. The applicability was also judged to be high as all treatments offered in the studies were considered to be available in a western health system. Taken together, the high strength, positive direction, high consistency, moderate to high generalizability, and high applicability of the VTC studies, led to the use of VTC-delivered telepsychology for clients with mental health conditions being ranked as 'Supported'.

Internet-delivered text-based treatments: Three studies were identified that investigated the effectiveness of psychotherapy delivered via the internet, in which therapists and clients communicated in real time through type-written responses (webchats). A meta-analysis by Bee and colleagues (2008) looked at psychotherapy delivered via a range of telepsychology modalities including the internet; and two individual RCTs assessed internet-

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delivered text-based therapy for depression with treatment as usual comparison groups (Kessler et al., 2009; Kramer, Conijn, Oijevaar, & Riper, 2014).

The evidence base for internet-delivered text-based therapy was judged to be of low strength, as it primarily consisted of two RCTs which were judged to be of low quality and have high risk of selection bias (Kessler et al., 2009; Kramer et al., 2014). Although there was one meta-analysis, this study did not provide enough information to assess the individual merits of internet-delivered text-based therapy and did not contribute to improving the strength of the evidence (Bee et al., 2008). The findings from the two RCTs were in the same positive direction, and the consistency was judged to be low to moderate as only two studies were included. The generalizability was judged to be moderate as one study used adults while the other used young people (i.e. where the mean age of the sample was 19.5 years). The applicability was rated as high, as the treatments were considered to be applicable and relevant to the western health system, given the treatments are available in western settings. Given the positive direction, low to moderate consistency, moderate generalizability, high applicability but low strength of the evidence, the effectiveness of internet-delivered text-based interventions for the treatment of mental health conditions including depression, anxiety, PTSD and adjustment disorder was considered to be 'Unknown'.

Discussion

The aim of this REA was to assess the effectiveness of telepsychology for clients with depression, anxiety, PTSD, or adjustment disorders. The reviewed literature suggests that there is a fast growing evidence base in this area. The REA found that the evidence base is currently strongest and of the highest quality in the area of telephone-delivered and VTC-delivered interventions. Both telephone-delivered and VTC interventions met the criteria for a 'Supported' treatment for mental health conditions, meaning that there is clear, consistent evidence of beneficial effect.

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The 'Supported' rating for telephone-delivered interventions was informed by three meta-analyses (two of good quality with few risk of bias issues, and one with moderate quality and bias issues) and several high quality RCTs, all of which indicated that telephone-delivered interventions are significantly more effective than TAU and, in non-inferiority trials, are as effective as standard in-person treatments. Of note, there was one high quality RCT with US veterans that did not find a significant difference in outcomes for telephone-delivered CBT for depression in comparison to a TAU group (Mohr et al., 2011). The authors suggest that this may be evidence that more treatment resistant groups, such as veterans, may need more intensive approaches to treatment than telephone-delivered therapy. The authors also question whether there may be a publication bias in the literature for telephone-delivered interventions, in which null results are not being routinely published. Alternatively, it may be the case that there is generally very little research being conducted on telephone-delivered interventions. This needs to be noted in an appraisal of the evidence base for telephone-delivered interventions for mental health conditions, but given the specific population in the study (veterans) and the strong weight of evidence in contrary to the findings of this study, it was not considered to be enough to lower the overall "Supported" ranking for telephone-delivered interventions for mental health conditions.

In the case of VTC-delivered interventions, the 'Supported' rating was informed primarily by five high quality RCTs with low risk of bias. Notably, these five RCTs were all conducted in the US with veteran populations (Acierno et al., 2016; Egede et al., 2015; Fortney et al., 2015; Morland et al., 2014; Yuen et al., 2015). Veterans are a specific population who may benefit from VTC interventions, given that they are a group with particularly high rates of mental health conditions (Ikin et al., 2004; Searle, Lawrence-Wood, Saccone, & McFarlane, 2013) and with documented barriers to accessing appropriate evidence-based treatments (Brooks et al., 2012). This is likely to be the reason for a

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proliferation of recent research into telepsychology-delivered interventions in veteran populations particularly.

The evidence for internet-delivered text-based synchronous interventions for mental health conditions was limited and primarily consisted of two RCTs judged to be of only moderate quality due to a lack of control of selection bias (Kessler et al., 2009; Kramer et al., 2014). These RCTs suggested that internet-delivered text-based synchronous interventions (by webchat) were superior to waitlist control, specifically in treating depression. Given the lack of high quality evidence in this area, the use of internet-delivered text-based synchronous interventions for mental health conditions was ranked as 'Unknown', indicating that there is insufficient evidence of beneficial effect and further methodologically rigorous research across different populations and mental health conditions is needed.

The technology involved in telepsychology interventions is relatively new, particularly in the case of VTC-delivered interventions. This is reflected in the fact that all of the VTC studies were conducted after 2013, with the more than half having been published in the last year. It is therefore likely that the evidence base for VTC interventions in particular will continue to grow at a rapid rate in the coming years.

Limitations and future directions

The findings must be considered alongside the limitations of an REA. The omission of potentially important papers, including those that were unpublished, non-English, published prior to 2005 limit the comprehensiveness of an REA (Varker et al., 2015). The evaluations of the evidence were not as exhaustive as in a systematic review or meta-analysis methodology, and the study results were not synthesised in a statistical way. The REA focused specifically on adults, meaning the relevance of these findings to children and adolescents is unknown. The majority of the included studies were conducted in western

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settings, which limits the generalizability to non-western countries. In addition, the scope of this review was guided by the funders of the research, and therefore limited to anxiety, depression, PTSD and adjustment disorder. As such, several other important psychiatric disorders were not investigated. Finally, due to the fact that this was an REA, data from the studies included in this review was not meta-analysed. This is a limitation of the REA methodology, in comparison to systematic reviews which often include meta-analysis.

An important direction for future research is to repeat and extend the current research, with the inclusion of meta-analysis. It will be important to identify which populations benefit most from telepsychology, and to also identify whether adverse effects are observed in any populations. In addition, the current review revealed that relatively few RCTs have been conducted on internet-delivered text-based interventions, and those that have been done have had methodological limitations. Therefore, there is a need for further well-designed RCTs to examine the efficacy of internet-delivered text-based interventions.

Conclusions

Based on the findings of this REA, both telephone and VTC-delivered interventions for mental health conditions are 'Supported' by the current available evidence. Synchronous internet-delivered text-based interventions require further methodologically rigorous RCTs and reviews in order to provide more robust data on their effectiveness. The potential for telepsychology to overcome common barriers to treatment access and its apparent efficacy and equivalence to in-person treatments therefore suggests that it is a promising delivery method for increasing the reach of evidence based psychological interventions. This may be of particular use in rural and remote communities who have significant issues with access to evidence based psychological therapies. Given that these are relatively new technologies,

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which are increasing in their mass availability, it will also be important to watch the evidence in this area over the next five to ten years.

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Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

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Figure 1: Flowchart of search for studies

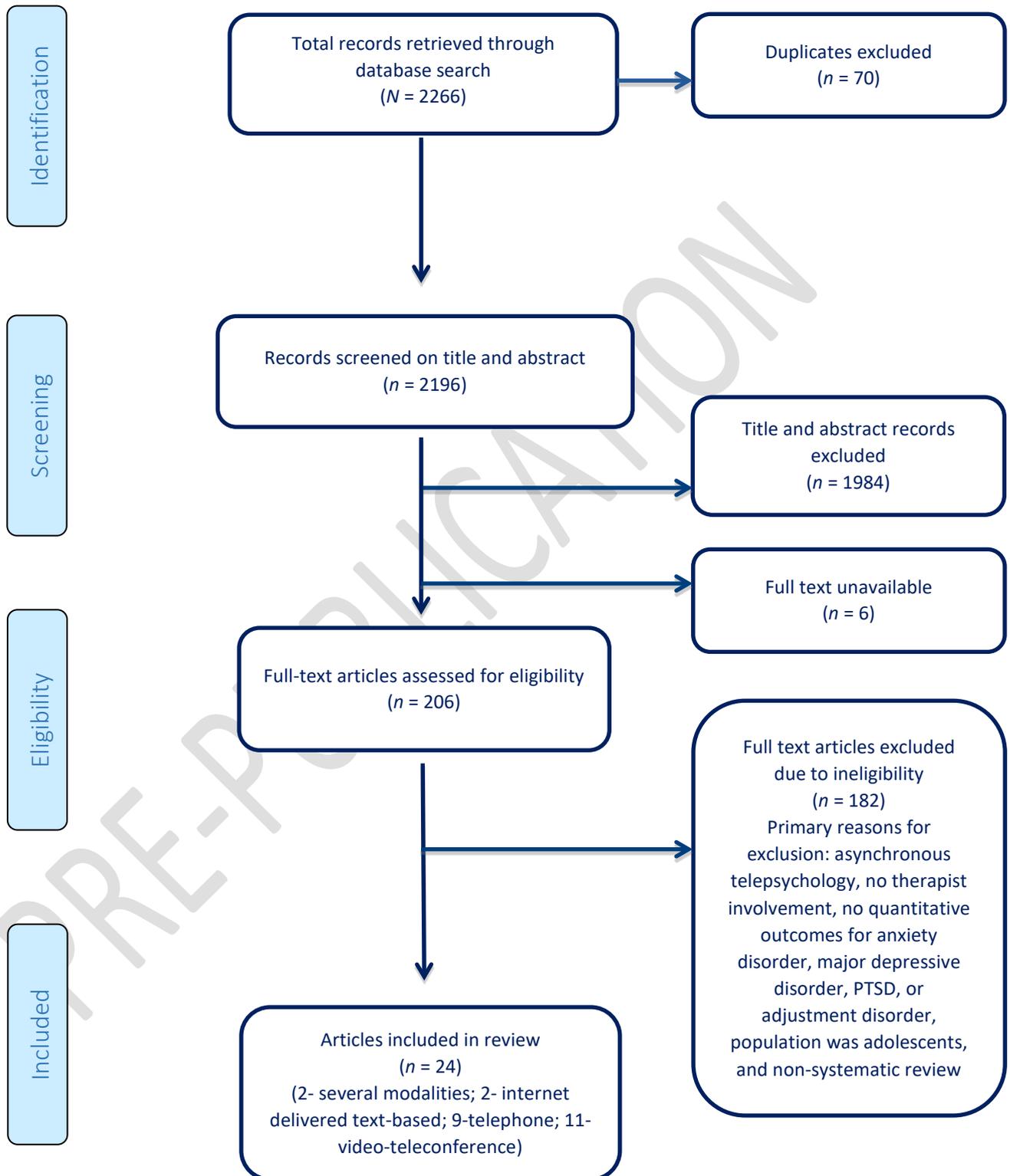


Table 1

Characteristics of the studies investigating synchronous telepsychology interventions

Intervention Type	Study	Design	Comparison condition	Total sample size, Sample description	Mean age (SD)^	Gender	Dosage of Intervention
Several Modalities							
Psychotherapy for depression or anxiety related disorders, delivered by telephone or video teleconference	Bee et al., 2008	MA of 13 controlled trials	TAU/ WL = 8 Face to face = 2 Telemedicine delivered alternative therapy = 3	Total sample = 1567; people with depression or anxiety disorders. Included samples from US ($n = 8$), Netherlands ($n = 2$), UK ($n = 2$) & Canada ($n = 1$)	NR	NR	Range: 8 – 16 sessions
Psychotherapy for depression, delivered by telephone or video teleconference	Osenbach et al., 2013	MA of 14 RCTs	TAU = 8 Face to face = 6	Total sample = 1725; people with depression. Details of countries where samples drawn from were not provided.	NR	NR	Range: 6-20 sessions
Internet delivered text-based treatments							
CBT for depression, delivered by webchat	Kessler et al., 2009	RCT with 4 and 8 month follow-up	TAU	297; UK primary care patients with confirmed primary diagnosis of depression	34.9 (11.6)	32% male	10 sessions within 16 weeks

Solution-focussed therapy, delivered by webchat	Kramer et al., 2014	RCT with 9 and 18 week follow-up	WL	263; Netherlands young people with depressive symptoms (CESD>20)	19.5 (1.7)	22.3% male	Mean number of 1.4 sessions with an average of 4.3 weeks between first and last session
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Telephone-delivered treatments

CBT for GAD	Brenes et al., 2015	RCT with 4 month follow-up	Telephone delivered NST	141 US rural older adults with a diagnosis of GAD	NR	18.4% male	9-11 weekly sessions of 50 minutes
CBT for depression	Dwight-Johnson et al., 2011	RCT with 6 month follow-up	Enhanced TAU	101; US Latino primary care patients in rural settings	39.8 (10.6)	22% male	8 weekly sessions of 45-50 minutes
PST for depression	Gellis et al., 2014	RCT with 12 month follow-up	TAU	115; US medically frail, older, homebound adults	79.2 (7.4)	34.3% male	8 weekly sessions with daily monitoring
Exposure and response prevention for OCD	Lovell et al, 2006	RCT with 6 month follow-up	Face to face	72; UK people with a diagnosis of OCD	31.9 (9.5)	40.3% male	10 weekly sessions of 60 minutes
CBT for depression	Ludman, 2007	RCT with 18 month follow-up	TAU	393; US patients with depression commencing anti-depressant treatment	44.4 (15.8)	24% male	8 sessions of 30-40 minutes, followed by 2-4 booster sessions over the course of a year

CBT for depression	Mohr et al., 2011	RCT with 6 month follow-up	TAU	85; US veterans with major depressive disorder	55.9 (10.59)	90.6% male	16 sessions of 45-50 minutes provided over 20 weeks
CBT for depression	Mohr et al., 2012	RCT with 6 month follow-up	Face to face CBT	325; US primary care patients with major depressive disorder	47.7 (13.1)	22.5% male	18 sessions of 45 minutes: 2 sessions weekly for first 2 weeks, then 12 weekly sessions, and 2 final booster sessions over 4 weeks
Psychotherapy for depression	Mohr et al., 2008	MA of 10 RCTs, 1 CT, 1 single-arm study	TAU	Total sample: 1312; People with current or previous depressive disorder. Details of countries where samples drawn from were not provided.	NR	NR	Range: 4-16 sessions
CBT for depression	Mohr et al., 2005	RCT with 12 month follow-up	Supportive, emotion-focussed therapy, delivered by telephone	127; US adults with multiple sclerosis	48.6 (9.6)	27.1% male	16 weekly sessions of 50 minutes
Video-conference delivered treatments							
BA-TE	Acierno et al., 2016	RCT with 12 month follow-up	Face to face BA-TE	232; US veterans with threshold or subthreshold PTSD	45.6 (14.9)	94.4% male	8 weekly sessions of 90 minutes

PST for depression	Choi et al., 2014	RCT with 9 month follow-up	Face to face PST	158; US low-income, homebound older adults with depression	64.8 (9.2)	21.5% male	6 weekly sessions
Collaborative care, including; monitoring, education, goal setting, pharmacist, psychiatrist, CPT	Fortney et al., 2015	RCT with 12 month follow-up	Face to face collaborative care	265; US rural veterans with PTSD	52.2 (13.8)	89.8% male	Varying numbers of sessions and services received.
BA	Egede et al., 2015	RCT with 12 month follow-up	Face to face BA	141; US older veterans	63.9 (5.1)	98% male	8 weekly sessions
CPT-C	Morland et al., 2014	RCT with 6 month follow-up	Face to face CPT-C	125; US veterans with PTSD	55.3 (12.5)	100% male	12 twice weekly sessions of 90 minutes
CPT	Morland et al., 2015	RCT with 6 month follow-up	Face to face CPT	126; US female veterans and civilians with PTSD	46.4 (11.9)	0% male	12 once or twice weekly sessions of 90 minutes
Psychological treatments for anxiety disorders	Rees & Maclaine, 2015	SR	50% uncontrolled. 50% with face to face control	Total sample = 613; Adults with PTSD, OCD, mixed anxiety and depression, panic disorder and social phobia. Details of countries where samples drawn from were not provided.	NR	NR	NR

CBT	Stubbings et al., 2013	RCT with 6 week follow-up	Face to face CBT	26; Australian adults with a mood or anxiety disorder	30 (11)	42.3% male	12 weekly sessions of 60 minutes
ERP	Vogel et al., 2014	RCT with 3 month follow-up	Self-help ERP or waitlist	30; Norwegian adults with OCD	33.1 (10.2)	40% male	15 90 minute sessions over 12 weeks
PE	Yuen et al., 2015	RCT with	Face to face PE	52; US veterans with PTSD	44.0 (15.18)	98.1% male	8-12 weekly sessions
CBT	Ziembra et al., 2014	RCT with no follow-up	Face to face CBT	18; US veterans with PTSD	NR	90% male	10 sessions over 15 weeks

Note: BA = behavioural activation, BA-TE = behavioural activation and therapeutic exposure, CBT = cognitive behavioural therapy, CPT = cognitive processing therapy, CT = controlled trial, ERP = exposure and response, GAD = generalised anxiety disorder, MA = meta-analysis, NR = not reported, NST = nondirective supportive therapy, OCD = obsessive compulsive disorder, PE = prolonged exposure, PST = problem solving therapy, PTSD = posttraumatic stress disorder, RCT = randomised controlled trial, SR = systematic review, prevention, TAU = treatment as usual, US = United States of America, WL = waitlist

PRE-PUBLICATION

Table 2.

Research evaluating the effectiveness of synchronous telemedicine-delivered psychological interventions for clients with high prevalence mental health conditions

Study	Mental health symptom outcomes measures	Key results	Comments	Quality assessment rating
<i>Several Modalities</i>				
Bee et al., 2008	MA of studies using various standardised mental health outcome measures.	<p>Compared to control conditions, remotely delivered therapy demonstrated a large effect size for anxiety-related disorders (1.15) and a medium effect size for depressive disorders (0.44).</p> <p>Attrition rates varied widely depending on population studied, nature of the intervention and length of follow-up, suggesting different treatment modalities may differ in their perceived acceptability.</p>	<p>Only two of the 13 studies compared remote versus face-to-face psychotherapy. The effect sizes for this comparison were non-significant and the shortage of literature limits the utility of this result.</p> <p>The majority of identified studies had small sample sizes and methodological weaknesses</p>	High quality
Osenbach et al., 2013	MA of studies using various standardised measures of symptoms of depression.	<p>Telemedicine-delivered interventions were found to be non-inferior to non-telemedicine-delivered formats ($g = 0.14$, $p = 0.98$).</p> <p>Studies that compared telemedicine interventions with TAU showed a small effect size ($g = 0.29$, $p < 0.001$), suggesting superiority of telemedicine interventions over TAU in reducing depression symptoms.</p> <p>Effects were moderated by TAU comparison groups, studies primarily targeting depression and studies using telephone-delivered</p>	<p>Individual study quality was not assessed or reported on.</p> <p>Results of individual studies were not reported in the review.</p>	Moderate quality

interventions specifically, with these moderators being related to larger effect sizes.

Internet delivered text-based treatments

Kessler et al., 2009	BDI-II SF-12 EQ-5D	<p>The online CBT intervention group were significantly more likely to recover from depression at four and eight month follow-up than those receiving TAU (odds ratio 2.39, $p=0.022$, odds ratio 2.07, $p = 0.023$).</p> <p>At four month follow-up the effect of the intervention was greater for participants with more severe baseline depression.</p>	Attrition rates from treatment were high (48 %).	Moderate quality
Kramer et al., 2014	CES-D	<p>Participants receiving the web-based chat intervention showed a significantly greater reduction in depressive symptoms at nine week ($d = 0.18$) and four and a half month follow-up ($d = 0.79$) compared to the waitlist group.</p>	<p>Participants were aged 12-22.</p> <p>There was high attrition (49% at 4.5 month follow-up) and limited adherence to the intervention, with only 42% of those who had access to the chat intervention making use of it.</p>	Moderate quality

Telephone-delivered treatments

Brenes et al., 2015	HAM-A PSWQ-A GAD-7 BDI-II	<p>At 4 month follow-up the telephone-delivered CBT group showed significantly greater reductions in worry severity ($p = 0.004$), GAD symptoms ($p = 0.005$) and depressive symptoms ($p = 0.02$) than the telephone-delivered NST group.</p>	Comparison of two telephone-delivered treatments.	High quality
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Dwight-Johnson et al., 2011	HSCL PHQ-9	<p>Patients in the telephone-delivered CBT group were more likely to experience improvement in depression compared to enhanced TAU participants ($t = -2.36, p=0.18$).</p> <p>A greater proportion of the telephone-delivered CBT group achieved treatment response at three months ($p=0.013$).</p> <p>The telephone-delivered CBT group reported being significantly more satisfied with their treatment.</p>	Only 44% of participants in the treatment group completed 6 or more sessions.	High quality
Gellis et al., 2014	HAM-D PHQ-9 SF-12 SPSI-R Satisfaction questionnaire Healthcare use	<p>Participants in the I-TEAM condition experienced significant decreases in depression symptoms at three months, compared to the TAU group ($p=0.02$) and these effects were maintained at six month follow-up ($p=0.05$).</p> <p>At twelve month follow-up, I-TEAM participants had significantly fewer visits to the ED than the TAU group ($p=0.03$), but no difference was found on days spent in hospital between the two groups ($p=0.06$).</p>	Participants were all older adults.	High quality
Lovell et al, 2006	Y-BOCS BDI-II	<p>Telephone CBT was found to be non-inferior to face-to-face CBT.</p> <p>Patients in both conditions reported high levels of satisfaction with the treatment.</p>		High quality
Ludman, 2007	HSCL PHQ-9	Patients in the telephone-delivered treatment group had significantly lower depression scores from 6 months to 18 month than the TAU group ($F(1,366)=11.28, p<0.001$).		High quality

		Forty-eight percent of patients in the phone therapy group were in remission at the 12 and 18 month follow-up, compared to 38% in the TAU group.		
Mohr et al., 2005	SCID – depression BDI-II HDRS PANAS-PA GNDS	Improvements on positive affect and HDRS depression scores were significantly greater in the T-CBT condition compared to the T-SEFT condition (p= 0.008, p = 0.02). At the 12-month follow-up period, but differences between treatments were no longer present.	Compares two telephone-delivered interventions.	Low quality
Mohr et al., 2008	MA of studies using various standardised measures of symptoms of depression.	Telephone-delivered psychotherapy resulted in significant reductions in symptoms of depression compared to control conditions (d = 0.26, p < 0.0001). Attrition rates were reported to be significantly lower compared to face-to-face treatments. Treatment format, specifically group vs individual, did not moderate treatment effectiveness. Treatments that were delivered by mental health professionals produced significantly greater reductions in depressive symptoms than other professionals.	Quality of included studies was not assessed or reported.	Moderate quality
Mohr et al., 2011	MINI- Depression HAM-D PHQ-9	When comparing telephone-delivered CBT with TAU, there were no significant time x treatment effects (ps > 0.20), suggesting that telephone-delivered CBT does not confer benefits over TAU.	Participants were all veterans. Authors suggest that this is a particularly treatment refractory group.	Moderate quality

Mohr et al., 2012 Secondary paper: Kalapatapu et al, 2014	HAM-D PHQ-9	<p>Significantly fewer participants discontinued the T-CBT compared to face-to-face CBT ($p = 0.02$)</p> <p>Telephone- delivered CBT was non-inferior to face-to-face CBT at posttreatment ($d=0.14$, $p = 0.22$).</p> <p>Participants receiving face-to-face CBT were significantly less depressed at six month follow-up ($p < 0.001$).</p> <p>A secondary analysis using this dataset was done by Kalapatapu et al. (2014) also found Telephone-delivered CBT to be non-inferior to face-to-face CBT in treating depression in a subgroup of participants with co-occurring alcohol use disorders.</p>	Sample size was relatively high in socio-economic status.	High quality
<i>Video-teleconference delivered treatments</i>				
Acierno et al., 2016	BDI-II PCL-5	PTSD and depression symptom improvement following VTC-delivered treatment was non-inferior to face-to-face-delivered treatment at posttreatment and three and six month follow-up.	Participants were all US veterans.	High quality
Choi et al., 2014	HAM-D WHODAS	<p>Both VTC-delivered PST and face-to-face PST were efficacious in reducing depression and disability.</p> <p>The effects of VTC-delivered PST were larger than those for face-to-face PST at 36 week follow-up for depression scores ($d=0.68$ vs $d =$</p>	Participants were all older adults.	Moderate quality

		0.20) and disability scores ($d = 0.47$ vs $d = 0.25$)		
Egede et al., 2015	GDS BDI-II SCID	The VTC condition was non-inferior to the face-to-face condition in treating depression.	Participants were all older US veterans.	High quality
Fortney et al., 2015	PDS HSCL SF-12	Patients in the VTC arm has significantly greater reductions in PTSD symptoms compared with usual care at six months ($p = 0.002$) and 12 months ($p = 0.04$).	The intervention was a collaborative care package which differed for each participant. 54.9% of the VTC group received CPT vs only 12.1% of the TAU group. CPT was a predictor of positive outcome, therefore the results do not necessarily show the efficacy of VTC per se, but show that VTC facilitates better access to care.	High quality
Morland et al., 2014	CAPS CPOSS-VA TSAS TEQ GTAS	VTC was found to be non-inferior to face-to-face treatment. Significant reductions in symptoms of PTSD were reported at post-treatment ($d = 0.78$, $p < 0.05$). These reductions were maintained at three and six month follow-up. Participants in both conditions reported high therapeutic alliance, treatment compliance and satisfaction, with no significant differences between conditions.		High quality
Morland et al., 2015	CAPS TEQ WAI-SF CPOSS-VA TSAS	The VTC condition was non-inferior to the face-to-face condition in treating PTSD symptoms at posttreatment ($d = -0.06$) and three ($d = 0.11$) and six month follow-up ($d = 0.17$).	Participants were all female. Method of randomisation was not described, selection bias was not adequately controlled, and outcome assessor blinding was not described	Moderate quality

Rees & Maclaine, 2015	SR of studies using various standardised mental health outcome measures	<p>VTC significantly reduced symptoms of Panic Disorder from pre to post-treatment, but further research is needed with larger samples and randomised controls.</p> <p>For OCD, all studies reported reductions in symptoms post-treatment, and those that also had a control condition reported non-inferior or better outcomes in the VTC condition compared to the control.</p> <p>For PTSD, all studies found significant reductions in symptoms of PTSD after VTC-delivered treatment. These results were limited by many studies lacking a control condition.</p> <p>In a single uncontrolled study of VTC for social phobia, VTC resulted in significant decreases in symptoms.</p> <p>An RCT examining VTC for mixed anxiety and depression failed to find any differences between the two groups.</p>	<p>The quality of included studies was not assessed or reported.</p> <p>Characteristics, baseline demographics and results of individual studies were not reported.</p> <p>50% of included studies were uncontrolled studies.</p>	Moderate quality
Stubblings et al., 2013	DASS BDI-II HAQ ASI PSWQ QLES WAI-SF TSQ	VTC was non-inferior to face-to-face treatment in treating depression ($d = 0.37$, $p = 0.165$), anxiety ($d = 0.22$, $p = 0.41$), stress ($d = 0.38$, $p = 0.15$), and improving quality of life ($d = 0.13$, $p = 0.77$).	Low quality	
Vogel et al., 2014	Y-BOCS VOCI ADIS-IV\BDI-II	Patients in the VTC condition reported significantly greater reductions in OCD	Low quality	

	WAI	symptoms compared to self-help and waitlist control groups ($F(2, 27) = 7.8, p = 0.002$).		
Yuen et al., 2015	PCL-M BDI-II BAI	There were no significant differences between the rates of PTSD diagnosis between VTC and face-to-face conditions at posttreatment ($X^2(2) = 0.62, p = 0.73$) VTC was non-inferior to face-to-face treatment for PTSD ($g=0.13$ and anxiety ($g= 0.10$). Non-inferiority analyses for depression were inconclusive ($g=-0.19$).	Participants were all US veterans. Randomisation not described.	High quality
Ziemba et al., 2014	CAPS HAM-A MADRS SF-36	Both groups evidenced a comparable reduction in symptoms for anxiety and depression. Overall treatment satisfaction was rated very high (95.3 out of 100), with patients in telemedicine being slightly more satisfied than those in face-to-face treatment (98.1 vs 92.1, respectively).	Relatively small sample size ($n=18$) and no statistical comparisons conducted.	Low quality

Note. ADIS-IV = anxiety disorders interview schedule for DSM-IV, ASI = anxiety sensitivity index, BAI = beck anxiety inventory, BDI II = beck depression inventory II, CAPS = clinician administered PTSD scale, CBT = cognitive behavioural therapy, CES-D = centre for epidemiological studies depression scale revised, CPOSS-VA = Charleston Psychiatric Outpatient Satisfaction Scale, DASS = depression, anxiety and stress scale, ED = emergency department, EQ-5D = Euroqol five dimensions questionnaire, GAD = generalised anxiety disorder, GAD 7 = generalised anxiety disorder 7 item scale, GDS = geriatric depression scale, GNDS = guys neurological disability scale, GTAS = group therapy alliance scale, HAM-A = Hamilton anxiety rating scale, HAM-D / HDRS = Hamilton depression rating scale, HAQ = health anxiety questionnaire, HSCL = Hopkins symptom checklist, I-TEAM = integrated telehealth education and activation of mood, MA = meta-analysis, MADRS = Montgomery-Asberg depression rating scale, MINI = Mini Neuropsychiatric Interview, PANAS-PA = positive and negative affect scale – positive affect, PCL-5 = PTSD checklist for DSM-5, PDS = PTSD diagnostic scale, PHQ-9 = patient health questionnaire 9, PST = problem solving therapy, PSWQ-A = Penn state worry questionnaire A, QLES = quality of life and enjoyment scale, SCID = structured clinical interview for DSM disorders, SF-12 = short form survey 12, SF-36 = short form survey 36, SPSI-R = social problem solving inventory – revised, SR = systematic review, TAU = treatment as usual, T-CBT = telephone delivered CBT, TEQ = treatment expectancy questionnaire, TSAS = telemedicine satisfaction and acceptance scale, TSQ = telehealth satisfaction questionnaire, T-SEFT = telephone delivered supportive emotion focussed therapy,

VOCI = Vancouver obsessional compulsive inventory, VTC = video-teleconference, WAI-SF = working alliance inventory –short form, WHODAS = world health organisation disability assessment scale, Y-BOCS = Yale-Brown obsessive compulsive scale.

PRE-PUBLICATION