The Efficacy and Attrition Risk of Video-Based Versus In-Person Psychotherapy for Depression:

A Meta-Analysis of Randomized Controlled Trials

By

Annaleis Giovanetti
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Chairperson: Stephen Ilardi, Ph.D.

Rick Ingram, Ph.D.

Eve-Lynn Nelson, Ph.D.

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The Thesis Committee for Annaleis Giovanetti

Certifies that this is the approved version of the following thesis:

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Chairperson: Stephen Ilardi, Ph.D.

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Abstract

Background: One contributing factor to the societal burden of depression involves a mismatch between treatment need and its availability, and advances in the delivery of telehealth services represent a promising development for addressing coverage gaps in mental health interventions. There have been questions about the degree to which delivery via videoconferencing could match the effectiveness of in-person services, and there is now a sufficiently large literature comparing psychotherapy for depression to address this question meta-analytically.

Methods: The Pubmed, PSYCinfo, and Cochrane Central Register of Controlled Trials (CENTRAL) databases were searched for articles from January 1, 2000 to May 1, 2020. A random-effects meta-analysis was conducted to evaluate potential differences in efficacy rates between the videoconferencing and in-person delivery of psychotherapy in reducing depressive symptoms. Odds ratios were calculated and meta-analyzed to examine any differences in attrition rates between video and in-person conditions. Subgroup analyses based on primary mental health outcome focus of the study (depression or other) were conducted using a mixed effects model.

Results: Primary study analyses yielded no evidence that video-based psychotherapy is less efficacious than in-person psychotherapy for reducing depressive symptoms. Additionally, there was no evidence that attrition rates significantly differed between the two conditions. No significant subgroup differences in either efficacy or attrition were observed.

Conclusion: The present findings suggest that video-based psychotherapy may be a feasible and effective alternative delivery modality to in-person services for reducing depressive symptoms. Continued research on the effectiveness of telehealth in clinically depressed samples and the barriers of each delivery modality can help the field better determine which patients benefit most from each type of service going forward.

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Background

Depression is one of the most prevalent and debilitating disorders in the world. It affects over 17 million adults in the United States each year, with an estimated lifetime prevalence of approximately 20% (Hasin et al., 2018; National Institute of Mental Health, 2019). Despite burgeoning research on the treatment of depression over the past few decades, the societal burden of the disorder remains stubbornly high (Mojtabai & Jorm, 2014), with depression-related healthcare costs totaling over $210 billion annually (Greenberg, Fournier, Sisitsky, Pike, & Kessler, 2015). Notably, only 12-13% of this amount reflects a direct cost of treating depression, whereas 48-50% results from lost work productivity and related economic opportunity costs.

There are numerous evidence-based therapies with demonstrated efficacy in treating depression, and meta-analytic reviews suggest that diverse psychotherapy protocols – including cognitive behavioral therapy, behavioral activation, interpersonal psychotherapy, and problem-solving therapy – may be comparably effective in treating depression (Cuijpers, Van Straten, Andersson, & Van Oppen, 2008; Hollon & Ponniah, 2010). One contributing factor to the societal burden of depression, however, involves a mismatch between treatment need and its availability. Approximately 35% of adults experiencing a major depressive episode each year do not receive any form of treatment at all (National Institute for Mental Health, 2019), which suggests a substantial unmet need for intervention. Advances in the delivery of telehealth services over the past two decades represent a promising development for addressing coverage gaps in mental health treatment, and the extant literature points to several advantages of telehealth across a variety of clinical service domains. (Although the term *telehealth*, or alternatively *telemedicine*, covers a range of service delivery methods, most of the emerging

research has focused on synchronous videoconferencing, which features live real-time interactions between patients and providers via video and typically involves adapting already established in-person services for the treatment setting.)

There exists a growing corpus of research support for the finding of equivalent outcomes of evidence-based psychotherapies delivered either in-person or via video across a wide range of psychiatric diagnoses, including anxiety disorders, posttraumatic stress disorder, mood disorders, substance use disorders, and eating disorders (Gros et al., 2013; Nelson & Duncan, 2015). A more recent review specifically examined the efficacy of remotely delivered psychotherapy for depression and anxiety (Lamb, Pachana, & Dissanayaka, 2019). Although it concluded that these are efficacious interventions, it also noted a relative dearth of recent research that compares in-person versus videoconferencing interventions head-to-head. This gap underscores the fact that, despite increased research on telehealth delivery of psychotherapy (e.g., delivered via telephone or asynchronous online programs), there still exists a need for additional high-quality investigations of videoconference-based psychotherapy efficacy.

Videoconferencing technology provides some clear advantages for the delivery of psychosocial interventions, principally by addressing three potential barriers to treatment: low accessibility, availability, and acceptability. All three barriers are salient to the treatment of individuals with depression (Mojtabai, 2009). Poor treatment accessibility often reflects the potential challenge of securing transportation to service providers, and the elimination of travel time (and associated travel costs) are a long-recognized advantage of telehealth service delivery, particularly for those living in rural communities (Orlando, Beard, & Kumar, 2019; Russo, McCool, & Davies, 2016). Additionally, lack of service availability serves as a substantial barrier for both rural and underserved urban populations. Deficient availability is largely due to

shortages of mental health professionals, especially those trained in empirically supported treatments (Dotson et al., 2014). Approximately 18% of counties in the United States have an unmet need for non-prescribing mental health professionals, with 8% of counties having at least half of their need unmet (Thomas, Ellis, Konrad, Holzer, & Morrissey, 2009). These shortages are largely concentrated in rural areas, but relative shortages also impact many individuals seeking services in urban settings. Telehealth allows providers to connect with those who seek treatment beyond such typical geographical constraints.

Finally, stigma often contributes to a reduction in the perceived acceptability of treatment services for depression. Military veterans, for example, report perceived stigma as a prominent reason for not seeking treatment (Acierno et al., 2016), and greater stigma regarding mental illness has also been reported in rural areas (Cheesmond, Davies, & Inder, 2019). Smaller rural communities are often characterized by decreased anonymity for those seeking treatment services, which in turn may exacerbate the perceived stigma (Kitchen Andren et al., 2013). Telehealth offers a unique appeal for individuals who may be hesitant to be seen seeking mental health services, who would presumably prefer the greater privacy afforded by telehealth.

Taken together, low accessibility, availability, and acceptability of treatment represent significant potential barriers that can be addressed with the help of telehealth. Such clear advantages of telehealth delivery may help account for its increased use over the past decade. There is evidence, in fact, that annual telemedicine visits grew an estimated 52% each year between 2005 and 2014, grew 261% from 2015 to 2017 (Barnett, Ray, Souza, & Mehrotra, 2018), and continue to soar to unprecedented levels as a result of the COVID-19 pandemic. Telehealth visits specifically targeting mental health grew 56% annually between 2005 and 2017. To examine telehealth delivery of mental health services more specifically, Mace and colleagues

(2019) conducted an extensive survey of behavioral health organizations across the country, finding that approximately half of behavioral health organizations report using telehealth services to address mental health, with 40% of these respondents using videoconferencing specifically (Mace, Boccanelli, & Dormond, 2019). However, among those that do use telehealth services, most report that fewer than 10% of their patients are seen via telehealth, thereby underscoring the limited use of such services. And although individual counseling represents the second most common form of tele-mental health services, most organizations use telehealth primarily for medication management purposes. In sum: psychotherapy services still represent a small fraction of services provided using telehealth modalities, and it has recently been estimated that only 10-20% of psychotherapy services are provided via videoconference format (Mace, Boccanelli, & Dormond, 2019).

The slow adoption of parity laws for telehealth reimbursement likely contributes to the relatively small proportion of psychotherapy delivered through this modality. All states have laws that address telehealth delivery and insurance coverage, yet such state-level policies vary widely in their specificity and scope regarding both coverage and reimbursement (Center for Connected Health Policy, 2019). Coverage parity refers to equivalent insurance coverage for *patients*, whereas payment parity encompasses *provider* reimbursement. Thirty-six states and the District of Columbia (D.C.) have coverage parity laws for private insurance, whereas only 21 states and D.C have Medicaid coverage parity policies (American Telemedicine Association, 2019). Fewer states have laws referencing payment parity, with 28 states having policies for Medicaid and 16 states having policies for private insurance payment parity (American Telemedicine Association, 2019). Medicare also covers synchronous telehealth services (e.g.,

videoconferencing), but limits reimbursement to services serving rural areas (Medicare Learning Network, 2020).

Despite recent increases in the use of telehealth services for psychotherapy, and progress towards equivalent reimbursement for such services, the total number of people receiving treatment via telehealth is still rather small in comparison with those who receive in-person services. In addition to the considerations mentioned previously, lingering questions about the equivalency of these services may also contribute to the slow adoption of telehealth psychotherapy. For example, could the video delivery of therapy have an adverse effect on the therapeutic alliance? The question was addressed in a 2014 review, which found that both providers and patients involved in telehealth services generally rate the therapeutic alliance at least as strongly as in-person settings (Simpson & Reid, 2014). The reviewers found, in fact, that therapists may be more likely to check in with clients for clarification when conducting therapy via video and may prepare more before videoconferencing sessions – factors that may contribute to positive ratings of therapeutic alliance. However, these findings are somewhat contradicted by those of a more recent review and meta-analysis of working alliance in randomized controlled trials of videoconferencing psychotherapy versus in-person services (Norwood, Moghaddam, Malins, & Sabin-Farrell, 2018), which found that working alliance in videoconferencing groups was inferior to that observed in the context of in-person services. However, it should be noted that all of the reviewed videoconferencing conditions still demonstrated a strong average working alliance. Additionally, this review had strict inclusion criteria that resulted in a limited sample of studies included ($k = 4$).

The two aforementioned reviews support the potential for establishing a strong therapeutic alliance in psychotherapy delivered via videoconferencing, but they do not fully

dispel questions about its equivalency to in-person services. On the other hand, patients generally tend to report similar treatment satisfaction of telehealth compared to in-person services (Jenkins-Guarnieri, Pruitt, Luxton, & Johnson, 2015). At the very least, then, it appears that therapists and clients are frequently able to adapt to the telehealth context as a viable modality for psychotherapy service delivery.

Patient safety (e.g., addressing suicidal ideation and intent) represents yet another potential concern about teletherapy, and particularly so when treating individuals with depression. There is a growing literature base, however, on how to establish safety plans when conducting services via telehealth, particularly in unsupervised settings (reviewed in Luxton, Sirotin, & Mishkind, 2010). This research suggests that safety concerns such as suicidality can be effectively managed in telehealth interventions, and that high-risk patients should not be excluded from this delivery method (McGinn et al., 2019).

If teletherapy is a generally viable modality to employ with suicidal patients, might it be suitable for use in the treatment of depression? There would appear to be both potential advantages and disadvantages. For example, depressed individuals often experience decreased energy and initiative, which can render them less likely to seek treatment – particularly when accessing services is already perceived as difficult, such as in rural settings. For such individuals, the convenience and ease of access afford by teletherapy could prove highly attractive. On the other hand, the very act of traveling to attend therapy sessions could conceivably serve as a form of behavioral activation – an inadvertent therapeutic benefit which is then lost when treatment is delivered via telehealth.

Since the development of teletherapy, there have been questions about the degree to which it could match the effectiveness of in-person services, and there is now a sufficiently large

literature comparing psychotherapy for depression to address this question. A recent systematic review captured the descriptive similarities and differences in videoconferencing compared to in-person services on depressive symptoms (Berryhill et al., 2019). However, the authors did not conduct a comprehensive quantitative analysis. Meta-analysis is well-suited to addressing the question at hand, and is particularly appropriate given the limited sample sizes typically involved in randomized controlled trials of psychotherapy. To my knowledge, only one meta-analysis has been published with a focus on teleconferencing and videoconferencing delivery of psychotherapy for depression (Osenbach, O'Brien, Mishkind, & Smolenski, 2013). However, this analysis largely consisted of examples using telephone (voice-only) delivery of services, with only four trials involving true videoconferencing – and only one trial that included depression as the primary treatment outcome variable. But numerous randomized controlled trials of psychotherapy delivery via videoconference have appeared since the work of Osenbach and colleagues (2013), and these are included in the current meta-analysis. Furthermore, psychotherapy delivered via telephone differs substantially from protocols adapted for video delivery. The format of videoconferencing more closely resembles in-person treatment and so for this reason, teleconferencing and videoconferencing are considered substantially heterogeneous for the purposes of the current study. Hence, only studies involving videoconferencing as the telehealth mode of delivery are included.

Recent improvements in telehealth technology (e.g., better and more reliable video quality), increased insurance reimbursement and structural support, and growing federal and regional telehealth resources have all contributed to growth in the number of studies examining telehealth delivery of psychotherapy. As many healthcare organizations transition in-person services to telehealth or expand on existing telehealth platforms during the COVID-19 pandemic

(Myers et al., 2020), this will likely change the landscape of telehealth beyond the current context. A meta-analysis of the existing research in this domain can serve as a resource when considering more widespread implementation of these services, and can help to address the growing need for treatment services for depression. Accordingly, the current study's primary aim is to examine the hypothesized equivalence of in-person and video-delivered psychotherapy in reducing depressive symptoms by extracting and meta-analyzing effect sizes from direct comparison randomized controlled trials. Additionally, as an important part of considering the equivalence of these services, attrition rates from these trials will be extracted and meta-analyzed, as well.

Method

Identification and selection of studies

This meta-analysis was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Moher et al., 2010) and the protocol was registered on the International Prospective Register of Systematic Review system (PROSPERO; Booth et al., 2012). The Pubmed, PSYCinfo, and Cochrane Central Register of Controlled Trials (CENTRAL) databases were searched for articles and dissertation/theses with publication dates from January 1, 2000 to May 1, 2020. The search included words and phrases related to "depression," "depressive symptoms", "videoconferencing," and "telehealth." Included studies were limited to the English language. The full list of search terms is included in Appendix A.

Inclusion and Exclusion Criteria/Study Selection

Each identified article was assessed by two reviewers. Inclusion criteria for this meta-analysis is as follows: (a) assessment of depressive symptoms (b) random assignment to either in-person or videoconferencing individual psychotherapy for a duration of six sessions or longer;

(c) psychotherapy intervention had evidence-base for treatment of depressive symptoms (d) participant age 18 or older. For the purposes of this review, interventions were determined to have an evidence-base for reducing depressive symptoms if there is a meta-analysis to support this. Studies were included if they measured depressive symptoms as a secondary outcome, but their primary outcome was treatment of a different DSM-5 disorder. Studies were excluded if participants were primarily recruited for the presence of a comorbid health condition (e.g., diabetes).

The search was limited to articles published in the English language. Studies for which insufficient data were available to calculate effect sizes directly (with means and standard deviations) or indirectly (with other statistics, such as t-value or p-value), were excluded.

Data Extraction

Two reviewers extracted the following information from eligible studies: full bibliographic information, study duration, participant demographics, presence of both in-person and videoconferencing treatment modality comparison, primary psychological focus, depression outcome measure, number of study withdrawals in each condition (if provided), and relevant data to calculate effect size data (e.g., sample size, mean, standard deviation). Corresponding authors were contacted to inquire about any insufficient information in these domains.

Data Synthesis and Analyses

Data analysis was performed in R Studio using the *metafor* and *dmetar* packages (Viechtbauer, 2010; Harrer et al., 2019a; Harrer et al., 2019b).

Efficacy Rates. A random effects meta-analysis was conducted to evaluate potential differences in efficacy rates between the videoconferencing and in-person delivery of psychotherapy in reducing depressive symptoms. Posttreatment Hedges' *g* effect size were

calculated for each study using the published sample sizes, means, and standard deviations of the depression outcome measures. If this information was unavailable, we attempted to calculate the effect size using other information published in the article (e.g., p-value) or contacted the study's corresponding author. Visual inspection of the funnel plot was used to assess for publication bias, and heterogeneity was assessed using prediction intervals and Higgins' & Thompson's I^2 (2002). Additionally, outlier and influence analyses were conducted to identify any studies that distorted results (Viechtbauer & Cheung, 2010)

Attrition Rates. The attrition rate for each study was calculated as the proportion of individuals who withdrew after being randomized to a psychotherapy condition to the total number of participants randomized to a condition. Odds ratios were calculated using the Mantel-Haenszel method and pooled to examine any differences in attrition rates between video and in-person conditions. Similar to the previous description of efficacy rate analyses, visual inspection of the funnel plot was used to assess for publication bias and outlier and influence analyses were conducted.

Subgroup Analysis. Subgroup analyses based on primary mental health outcome focus of the study (depression or other) were conducted using a mixed effects model (random-effects within, fixed-effects between). Subgroup analyses were conducted for both attrition and efficacy (depressive symptom reduction) outcomes.

Risk of Bias. Risk of bias was assessed using criteria from the revised Cochrane risk of bias tool for randomized controlled trials (RoB 2; Sterne et al., 2019). This includes evaluation risk across five domains: bias arising from the randomization process, bias due to deviations from intended interventions, bias due to missing outcome data, bias in measurement of the outcome, and bias in selection of the reported result for each included study (for a more detailed

description, see Higgins et al., 2016). Two reviewers classified all included studies as low risk, some concerns, or high risk of bias in each domain. The overall risk of bias judgments were then used to determine the quality of evidence using the GRADE criteria (Balshem et al., 2011). Quality of evidence will be graded as “very low”, “low”, “moderate” or “high”, and was based on five domains (risk of bias, inconsistency, indirectness, imprecision, and publication bias).

Results

Study selection

The search of Pubmed, PsycINFO, and Cochrane Central Register of Controlled Trials (CENTRAL) identified 3026 candidate articles in total (see Figure 1). After removing duplicates, 2015 articles remained. Titles and abstracts of these articles were screened, and 58 articles were retrieved for full-text review. Studies described by the resulting set of full-text articles were then excluded based on the following criteria: a) participants primarily recruited for health condition, b) lack of randomization, c) differing therapeutic protocols in each condition, d) lack of depressive symptom outcome measure, e) lack of video-based or in-person condition, f) extension of study already included, g) wrong publication type (abstract only, clinical trial registration). After review, 11 studies met inclusion criteria. Authors of four studies were contacted to request additional data requisite for quantitative analyses, and four responses were received. Data needed to calculate effect size were still not available for one study (Ziemba et al., 2014), which could not be included. In the end, 10 studies were eligible and included in final quantitative analyses of the present investigation (Acierno et al., 2016; Acierno et al., 2017; Choi et al., 2014; Egede et al., 2015; Liu et al., 2019; Luxton et al., 2016; Maieritsch et al., 2016; Mitchell et al., 2008; Morland et al., 2020; Stubbings et al., 2013).

Study characteristics

The ten included studies were published between 2008 and 2020, and all studies were randomized controlled trials examining the efficacy of psychotherapy delivered via video in direct comparison with in-person services (see Table 1). The ten studies included a total of 1429 participants, with 712 receiving video-based intervention and 717 assigned to in-person treatment. Total sample sizes across the 10 studies ranged from 26 to 265 participants. The primary diagnostic focus of the included studies was listed as follows: posttraumatic stress disorder (k = 5), depression (k = 3), bulimia nervosa (k = 1), and a combination of mood and anxiety disorders (k = 1). Psychotherapeutic interventions included cognitive processing therapy (CPT), behavioral activation (BA), behavioral activation and therapeutic exposure, prolonged exposure (PE), problem-solving therapy, and cognitive-behavioral therapy (CBT). Half of the included studies used the Beck Depression Inventory (BDI) as the outcome measure of depressive symptoms, two used the Hamilton Rating Scale for Depression, one used the Depression, Anxiety and Stress Scale (DASS) depression subscale, and one used the Patient Health Questionnaire – 9 item version (PHQ-9). Furthermore, one study included two video-based psychotherapy conditions, either delivered to the home or delivered to a telehealth site (Morland et al., 2020). Data from the home-based video condition was selected for inclusion in the current analysis because its delivery modality most closely resembled the in-person services delivered at the patient's home.

Efficacy rates

Nine of the ten reviewed studies reported post-intervention scores on depressive outcome measures needed to calculate effect sizes[1]. The trial conducted by Choi and colleagues (2014)

[1] Data unreported in two published articles (Acierno et al., 2016; Acierno et al., 2017) was provided via email by the corresponding author.

did not collect acute outcome data based on a fixed treatment endpoint, and so depressive symptom scores from the reported 12-week time point were included.

One study (Egede et al., 2015) only reported the proportion of participants that achieved a prespecified threshold for favorable treatment response (50% reduction in symptoms as measured by BDI), but specific BDI means and standard deviations of study patients were not reported. Accordingly, an effect size estimate was calculated given the binary proportion data available, but this may not be as precise as those calculated for the other included studies, each of which provided continuous outcome measures of depressive symptoms. Additionally, because of the limited data available, a Cohen's *d* was calculated instead of a Hedge's *g* in order to maintain confidence interval estimates of the estimated effect size. Although these are distinct measures of effect size, it is important to note that Cohen's *d* and Hedge's *g* converge except in cases of small sample size. Given that this study included a sufficient sample size (total n = 241), the two measures of effect size are regarded as roughly equivalent.

Stubbings et al. (2013) included two potential depressive symptom outcome measurements. Participants completed disorder-specific measures (e.g., participant with major depressive disorder as primary diagnosis would complete BDI) and authors reported the proportion of participants who met criteria for clinically significant change on these measures. All participants also completed the DASS depression subscale. The DASS depression subscale was chosen to calculate the effect size estimate for this study because of its enhanced precision (continuous vs. dichotomous) and because it offered a more robust sample compared to the small number of participants with primary diagnoses of depressive disorders (total n = 6). Additionally, the trial conducted by Egede and colleagues (2015) used two depressive symptom outcomes measures, the Geriatric Depression Scale and the Beck Depression Inventory (BDI). Outcomes

from the BDI were used in this meta-analysis to enhance the consistency of comparison across studies.

Individual effect sizes of included studies ranged from g = -0.65 to g = 0.44, with positive effects indicating that video-based psychotherapy resulted in a greater decrease in depressive symptoms and negative effects indicating that in-person psychotherapy resulted in a greater reduction in depressive symptoms. The pooled standardized mean difference comparing video-based with in-person psychotherapy was 0.06 (95% CI, -0.12; 0.23; p = 0.48) and indistinguishable from zero (Figure 2). Examinations of homogeneity revealed a small I^2 value of 8% (p = 0.37). The I^2 may be biased in meta-analyses with a small number of studies, and so the prediction interval of the overall effect size was also used to estimate homogeneity. The prediction interval of the overall effect size (-0.43, 0.55) reflects heterogeneity in its calculation, but because it does not differ greatly from the 95% confidence interval of the effect size estimate, it suggests a small impact of heterogeneity. Considered in tandem, the prediction interval and I^2 value suggest a low level of heterogeneity. Additionally, outlier analyses of effect sizes were conducted to determine if any studies had an extreme estimated effect size with confidence intervals that did not overlap with the pooled effect size estimate, and no outliers were detected. Influence analyses were also conducted based on the Leave-One-Out method to determine whether a study was overly contributing to heterogeneity (Viechtbauer & Cheung, 2010), and it did not identify any influential studies. Visual inspection of the funnel plot did not reveal any evident signs of publications bias (Figure 3). Sensitivity analyses were not conducted due to overall low heterogeneity and the absence of evident publication bias.

Attrition rates

All included studies reported the total number of participants randomly assigned to each condition and sufficient information to calculate the number that withdrew before completing treatment. When the number of participants that withdrew was not reported directly, it was calculated by subtracting the treatment completers or per-protocol sample size from the total number of those randomly assigned to treatment. Only three of the ten studies reported reasons for withdrawal or dropout from treatment in any level of detail. The pooled odds ratio estimate for overall attrition rates was 1.06 (95% CI, 0.75; 1.50), indicating no significant difference between attrition in video-based and in-person psychotherapy conditions (Figure 4). There was low to moderate heterogeneity among the included studies, as evidenced by an I^2 value of 31% ($p = 0.16$) and moderately wide effect size prediction interval (0.44; 2.57). Visual inspection of the funnel plot (Figure 5) did not reveal evident signs of publication bias. Outlier and influence analyses of effect sizes were conducted, and no outliers or influential cases were detected. Sensitivity analyses were not performed due to low heterogeneity and absence of evidence of publication bias.

Subgroup analyses. There were three studies targeting depressive disorders as their primary psychological diagnoses (Choi et al., 2014; Egede et al., 2015; Luxton et al., 2016), and seven that targeted other primary psychological diagnoses. The sample in Stubbings et al. (2013) included individuals with either primary depressive or anxiety disorders, but only 7 of the 26 included participants with a primary diagnosis of major depressive disorder or dysthymic disorder. Therefore, this study was excluded from the depression specific subgroup analysis.

There was not a statistically significant difference between the pooled effect size of the depression subgroup ($g = -0.06$) and the pooled effect of the studies with primary diagnoses other than depression ($g = 0.11$) in terms of efficacy rates ($Q = 1.21$; $p = 0.27$) (Figure 6); moreover,

neither pooled effect was significantly different from zero. Similarly, subgroup analyses were conducted for attrition rate outcomes. There was no significant difference between the pooled effect sizes of the primary depression group and the group of other psychological diagnoses (Q = 0.001; $p = 0.97$) for attrition rates (Figure 7). Given the limited number of studies in each group, these subgroup analyses should be interpreted with caution.

Risk of bias

Risk of bias was assessed for each of the included studies across five domains (Figure 8, Figure 9). Most studies reported sufficient information about the randomization process, however only one study reported whether random assignment was concealed until participants were enrolled in their assigned conditions (Egede et al., 2015). Due to the nature of the intervention, participants in all studies were aware of their assigned treatment condition during the trial. Risk of bias due to missing outcome data was high for most included studies due to a lack of sufficient information regarding reasons for treatment withdrawal. Finally, risk of bias was generally low for outcome measurement and selection of the reported result.

The overall quality of evidence across both efficacy and attrition outcomes was assessed using the GRADE criteria (Table 2). Depressive symptom efficacy outcomes were judged to have moderate quality of evidence to support confidence in the effect size estimate. Missing data and an absence of reported reasons for attrition presented a risk of bias for interpreting effect sizes of depressive symptom outcomes. Attrition outcomes were judged to have low quality of evidence due to lack of reasons for attrition and small effect sizes with large confidence intervals.

Discussion

The current meta-analysis examined the efficacy and attrition rates of in-person versus videoconference-based psychotherapy modalities in the reduction of depressive symptoms. Ten

direct-comparison randomized controlled trials were identified, and primary study analyses yielded no evidence that video-based psychotherapy is less effective than in-person psychotherapy for reducing depressive symptoms. Additionally, there was no evidence that attrition rates differed significantly between the two conditions. Overall, these findings suggest that video-based psychotherapy is comparable to in-person psychotherapy among published studies measuring depressive symptom outcomes.

Pre-specified subgroup analyses were conducted to examine potential differences between efficacy and attrition rates of studies with clinically depressed populations and those targeting other psychological diagnoses. Analyses found no significant subgroup differences in attrition or reduction of depressive symptoms. This suggests that video and in-person delivery of the same therapy are comparable in reducing depressive symptoms for both subgroups. Additionally, attrition appears to be similar between video and in-person conditions for both psychotherapies targeting depressive symptoms and for interventions targeting other symptoms. However, these analyses should be interpreted with caution given the small number of studies (k=3) specifically targeting depressive disorders.

Overall, the studies in the present analysis had low-to-moderate risk of bias, with one notable exception: their limited reporting on missing patient outcome data. Most included studies did not sufficiently report participants' reasons for treatment dropout, thereby elevating the risk of bias, inasmuch as, we were not able to comprehensively assess the possibility of differences in reasons for treatment withdrawal across conditions. Additionally, there was large observed variability in dropout rates across studies, with higher-than-expected attrition (over 40%) observed in some studies (Maieritsch et al., 2016; Mitchell et al., 2008; Morland et al., 2020). There was no evidence in the present analyses of significant publication bias affecting the

estimated pooled effect sizes, but more published trials are needed before any strong conclusions about publication bias (or the absence thereof) are warranted.

The present study expands upon the previous meta-analysis of Osenbach and colleagues (2013), which found no evidence of differential efficacy between synchronous telehealth (e.g., video, telephone) and in-person psychotherapy delivery modalities in the relief of depressive symptoms. Notably, however, their analysis incorporated numerous trials in which the intervention was administered via telephone, and only four studies that utilized videoconference in the delivery of treatment. Due to the substantial increase in the number of randomized controlled trials of video-based psychotherapy in recent years, the present investigation was able to focus exclusively on such trials and to exclude all studies of telephone-delivery modalities, thereby decreasing methodological heterogeneity.

Our findings are also consistent with broader qualitative reviews of telehealth services that generally support the effectiveness of video-based psychotherapy across diagnoses and settings (Hilty et al., 2013; Gros et al., 2013; Berryhill et al., 2019; Lamb et al., 2019). Additionally, the present findings are consistent with the hypothesis that nonspecific therapeutic processes, such as the initiation of a positive therapeutic alliance, can be adequately established within video delivery modalities. Presumably, if the working alliance in video-based psychotherapy were considerably weaker than that of in-person treatment, this deficiency would negatively affect treatment outcomes – which was not observed in this analysis. However, because no explicit measurement of psychotherapy process variables was undertaken in the included treatment outcome trials, definitive conclusions on this point must await further research.

Our observed evidence for the equivalence of video-based psychotherapy has potentially important implications for the practice of psychotherapy, and especially for the treatment of depression and depressive symptoms. Delivery of psychotherapy via videoconferencing can increase patient access to evidence-based interventions, and may also thereby help to address the large unmet need for treatment in depressed populations. Notably, video-based psychotherapy has the potential to help prospective patients overcome barriers to treatment that stem explicitly from the presence of depressive symptoms, such as lack of motivation and lethargy – that can make it particularly difficult to attend sessions in person. In this way, telehealth may increase treatment access for patients who would otherwise not receive care. Video-based psychotherapy may also allow for more frequent contact with homebound or socially isolated patients, and provide more frequent opportunities for clinicians to assess patient risk and even to intervene earlier (Pruitt, Luxton & Shore, 2014). Researchers have likewise focused on the potential of telehealth modalities to facilitate effective assessment and intervention with suicidal individuals remotely in the context of the ongoing pandemic (Jobes, Crumlish, & Evans, 2020).

The pandemic has rapidly shifted the delivery of mental health services to video-based interventions, a development that has important implications for the practice of psychotherapy going forward. A large share of clinicians and their clients have now had exposure to telehealth, thereby increasing their comfort with the practice of video-based psychotherapy. Parity laws have also expanded insurance coverage of telehealth services during COVID-19 to increase access to care, and many organizations without telemedicine capabilities prior to the pandemic now have such systems in place. Although it is difficult to predict to what extent video-based psychotherapy will remain widespread following the pandemic's resolution, it appears safe to assume that the telehealth genie will never go fully back in the bottle – i.e., that there will remain

a high level of demand among both psychotherapists and clients for such services. Because the present study provides support for the efficacy of psychotherapy delivered via videoconferencing in reducing depressive symptoms, it can serve as an important point of reference for policymakers when considering the more widespread implementation of these services in a post-pandemic world. Optimizing both in-person and video-based services will be essential for increasing access to evidence-based care and addressing the high unmet need for treatment among patients experiencing depression, both during the pandemic and beyond.

Limitations

Despite a recent increase in reported randomized controlled trials comparing video and in-person services, the modest number of relevant studies still remains a limitation of the current meta-analysis. Moreover, depressive symptoms were not the primary outcome in the majority of our included studies, so more trials that focus on the treatment of depression as the primary diagnosis are needed to permit a more robust evaluation of the comparative efficacy and attrition rate of telehealth interventions. Ten studies were included in final analyses testing the attrition and efficacy of the two treatment delivery modalities on reducing depressive symptoms, with only three primarily targeting clinical depression (Choi et al., 2014; Egede et al., 2015; Luxton et al., 2016). Additionally, because only direct-comparison RCTs were included in the present study, trials that compared video-based psychotherapy to other conditions or controls were not examined, despite their potential to shed additional light on teletherapy efficacy. Trials were also excluded if participants were primarily recruited on the basis of a health condition for which depressive symptoms might constitute a co-occurring complication.

Although the studies included in the present meta-analysis covered a range of treatment settings and patient populations (e.g., homebound low-income older adults, older veterans,

community sample), continued research is needed to further examine the effectiveness of telehealth services across an array of diverse groups. The authors of many included trials, for example, alluded to the potential benefits of telehealth services for rural populations, and yet most did not include a targeted rural sample due to randomization constraints (e.g., participants needed to be able to engage in in-person services if they were randomized to that condition). However, there is a substantial body of research supporting the implementation of telemental health in rural populations and its benefits for increasing access to care.

Overall, the generalizability of our findings may be limited due to the relatively homogenous patient samples of its constituent psychotherapy trials. However, despite these limitations, the narrow inclusion criteria for the current meta-analysis allowed for more accurate comparison across studies and estimates of pooled effect size. Furthermore, in-person services provide a strong comparator condition, and permit a direct means of evaluating the hypothesized equivalency of video-based and in-person psychotherapy.

Future directions

It will be important for future investigations of teletherapy for depression to consider potential moderators of treatment response (and treatment modality preference) among those who receive video-based psychotherapy delivery. Some extant research suggests that perceptions of telehealth do not affect treatment outcome (Price & Gros, 2014), but symptom severity, stigma, and convenience may influence treatment-seeking of telehealth services in ways that vary from that of in-person services (Pruitt et al., 2019). Elucidating the salient barriers to treatment in each condition can help identify the optimal treatment modality for patients. For example, barriers to video-based services could involve the unavailability of sufficient technological proficiency or a high-speed internet connection, whereas transportation and

location may present as barriers for in-person services. This issue may be particularly relevant with respect to the moderating impact of depressive symptom severity, inasmuch as patients experiencing more severe symptoms may prefer telehealth services (Pruitt et al., 2019). However, as Pruitt and colleagues point out, this telehealth preference could also entail possible negative effects for depressed patients, given that attending in-person services requires a level of behavioral activation not required for video-based services, particularly those delivered to the home. The present meta-analysis did not examine the degree to which depressive symptom severity predicted treatment efficacy or attrition in either treatment modality, and so this remains an important area of future research.

Finally, the present meta-analysis did not examine differences between videoconferencing psychotherapy delivered to the patient's home versus services delivered to a designated telehealth site. Five of the ten studies involved home-based telehealth, four focused on video-based services delivered to a site (such as a clinic), and one included both delivery sites. Due to reimbursement rates, telehealth services prior to COVID-19 were typically delivered to a site, but there has been a shift to home-based services during the pandemic. Studying the differences between these telehealth delivery settings, including the populations they serve and their respective barriers, will be an essential area of future research.

Conclusion

In summary, this meta-analysis provides further evidence to support the comparable efficacy of video-based psychotherapy to in-person services for reducing depressive symptoms. Combined with results showing no evidence of significant differences in attrition rates between video and in-person conditions, the present findings suggest that video-based psychotherapy may be a feasible and effective alternative delivery modality to in-person services for reducing

depressive symptoms. It is unclear what the landscape of telehealth will look like in the years following COVID-19, but the pandemic may have served as a catalyst to remove structural and institutional barriers that have previously prevented organizations from implementing telehealth services. Continued research on the effectiveness of telehealth in clinically depressed samples and the barriers of each delivery modality can help the field better determine which patients benefit most from each type of service going forward.

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Figure 1

PRISMA flow chart

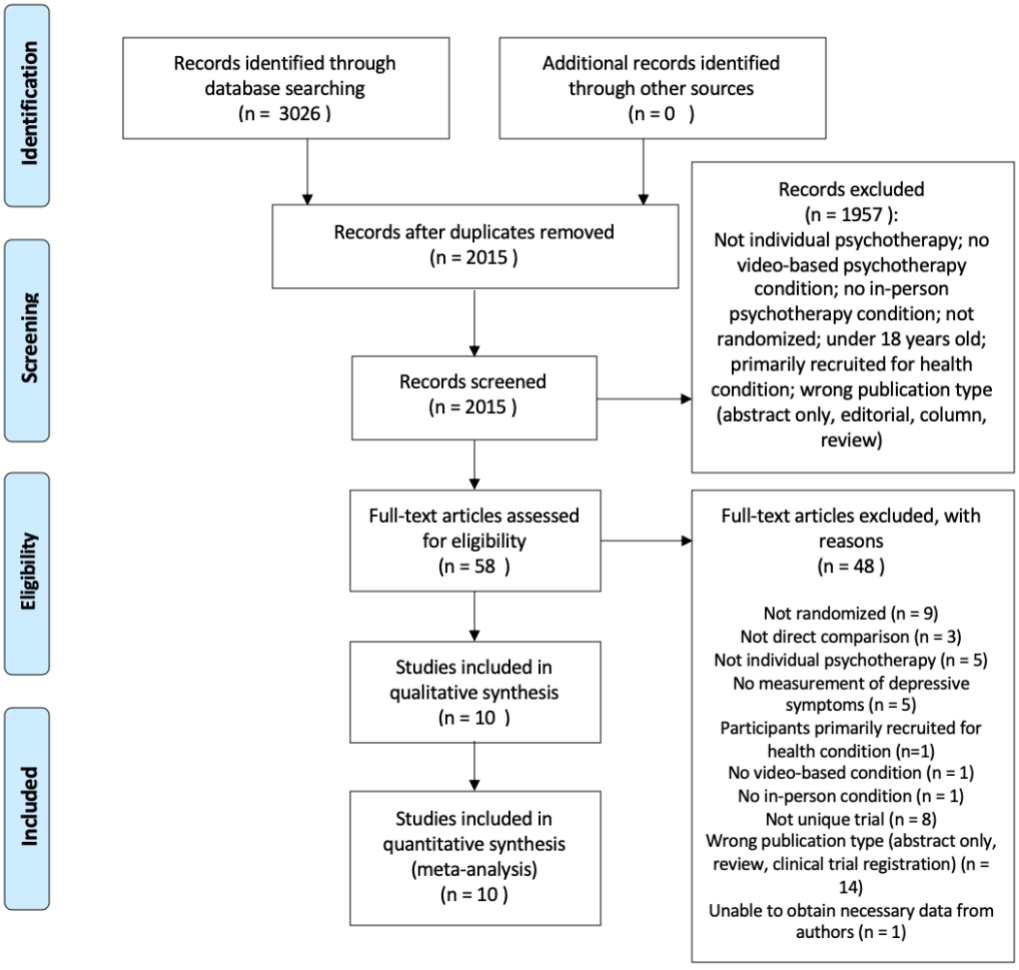


Table 1

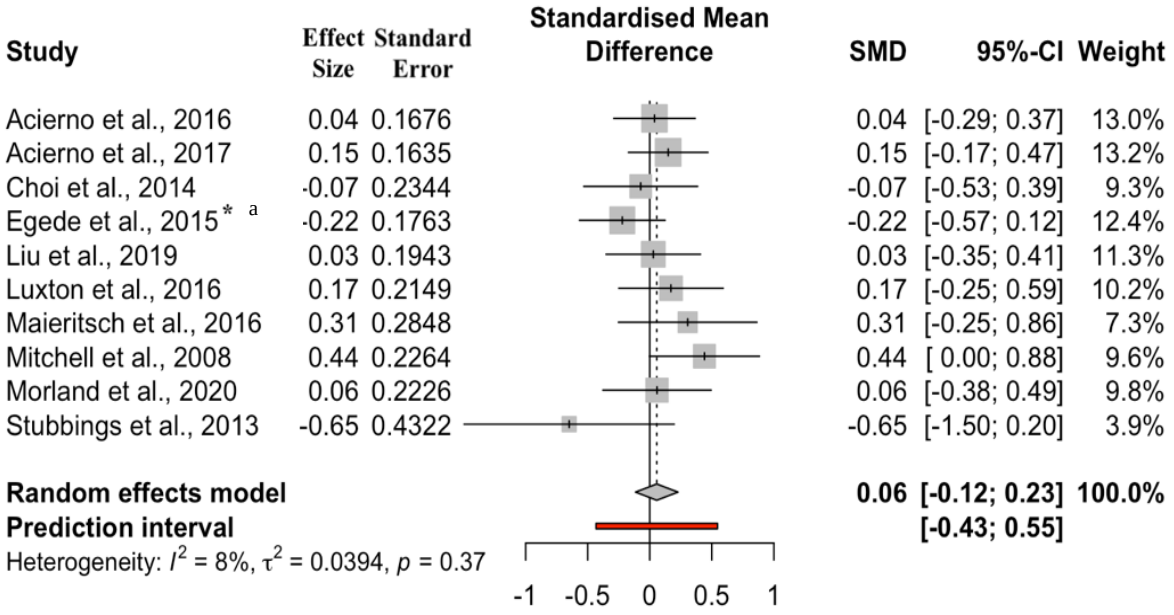
Study Characteristics

Study	**Intervention**	**Duration**	**Primary dx**	**Depressive Outcome Measure**	**Sample**
Acierno et al., 2016	Behavioral activation and therapeutic exposure	8 sessions (1.5 hr each)	Posttraumatic stress disorder	BDI	Combat veterans
Acierno et al., 2017	Prolonged exposure	10-12 sessions (1.5 hr each)	Posttraumatic stress disorder	BDI	Combat veterans
Choi et al., 2014	Problem-solving therapy	6 sessions (60 min each)	Depressive disorder (MDD, PDD, NOS)	HAM-D	Low-income, homebound older adults
Egede et al., 2015	Behavioral activation	8 sessions (60 min each)	Major depressive disorder	BDI	Older adult veterans
Liu et al., 2019	Cognitive processing therapy	12 sessions (60 min each)	Posttraumatic stress disorder	PHQ-9	Veterans
Luxton et al., 2016	Behavioral activation	8 sessions (50-60 min each)	Depressive disorder	BDI	Military personnel and veterans
Maieritsch et al., 2016	Cognitive processing therapy	10 sessions, once or twice per week (50 min each)	Posttraumatic stress disorder	BDI	Veterans
Mitchell et al., 2008	Cognitive behavioral therapy	16 sessions (50 min on average)	Bulimia nervosa	HAM-D	Community sample
Morland et al., 2020	Variable length prolonged exposure	6-15 sessions, depending on treatment response (90 min each)	Posttraumatic stress disorder	BDI	Veterans
Stubbings et al., 2013	Cognitive behavioral therapy	12 sessions (60 min)	Mood or anxiety disorder	DASS Depression Subscale	Outpatients at university clinic

Note: BDI = Beck Depression Inventory, PHQ-9 = Patient Health Questionnaire, HAM-D = Hamilton Rating Scale for Depression, DASS = Depression Anxiety and Stress Scale

Figure 2

Efficacy Forest Plot



[a] Cohen's *d* effect size calculated from dichotomous treatment response data provided in published article.

Figure 3

Efficacy Funnel Plot

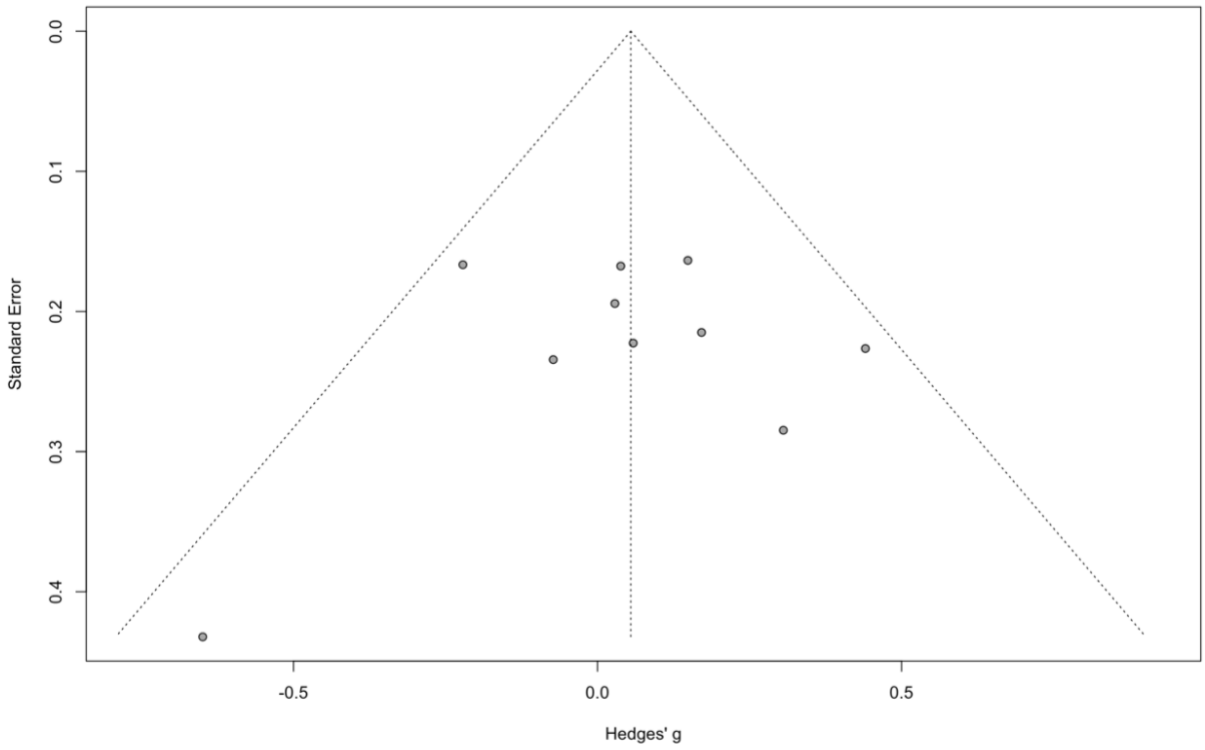


Figure 4

Attrition Forest Plot

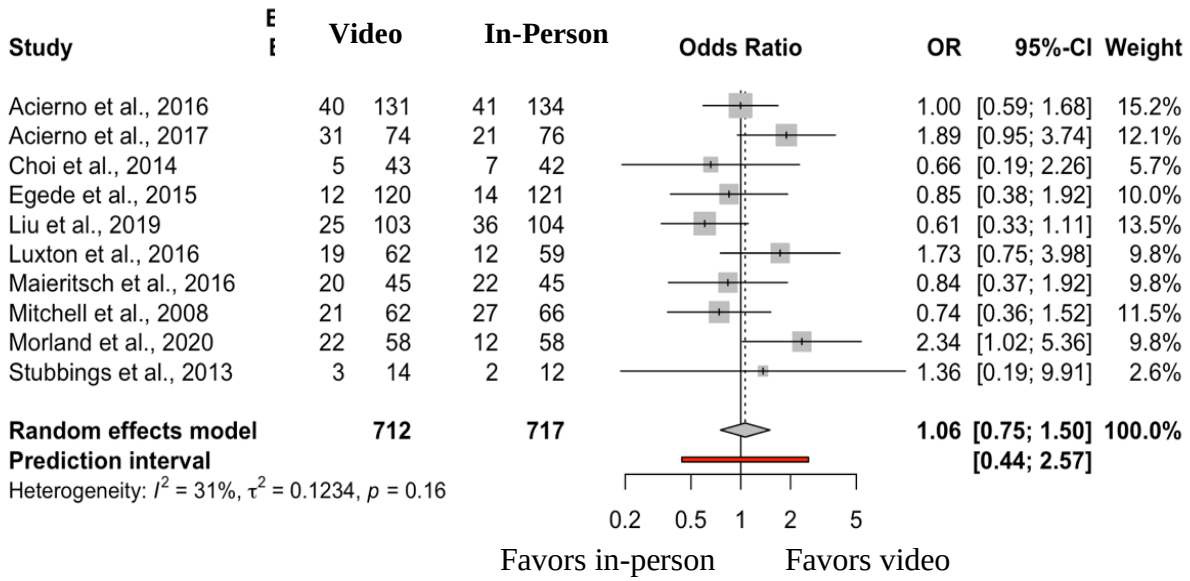


Figure 5

Attrition Funnel Plot

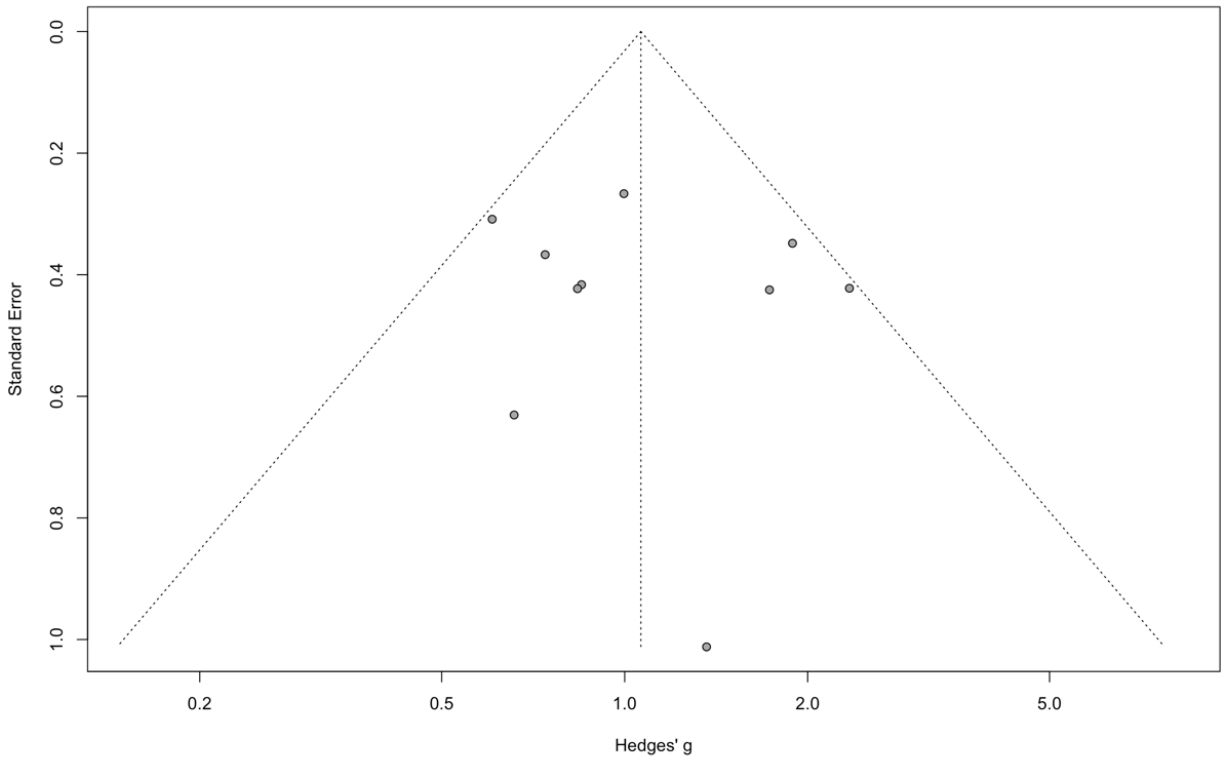


Figure 6

Subgroup Efficacy Rate Forest Plot

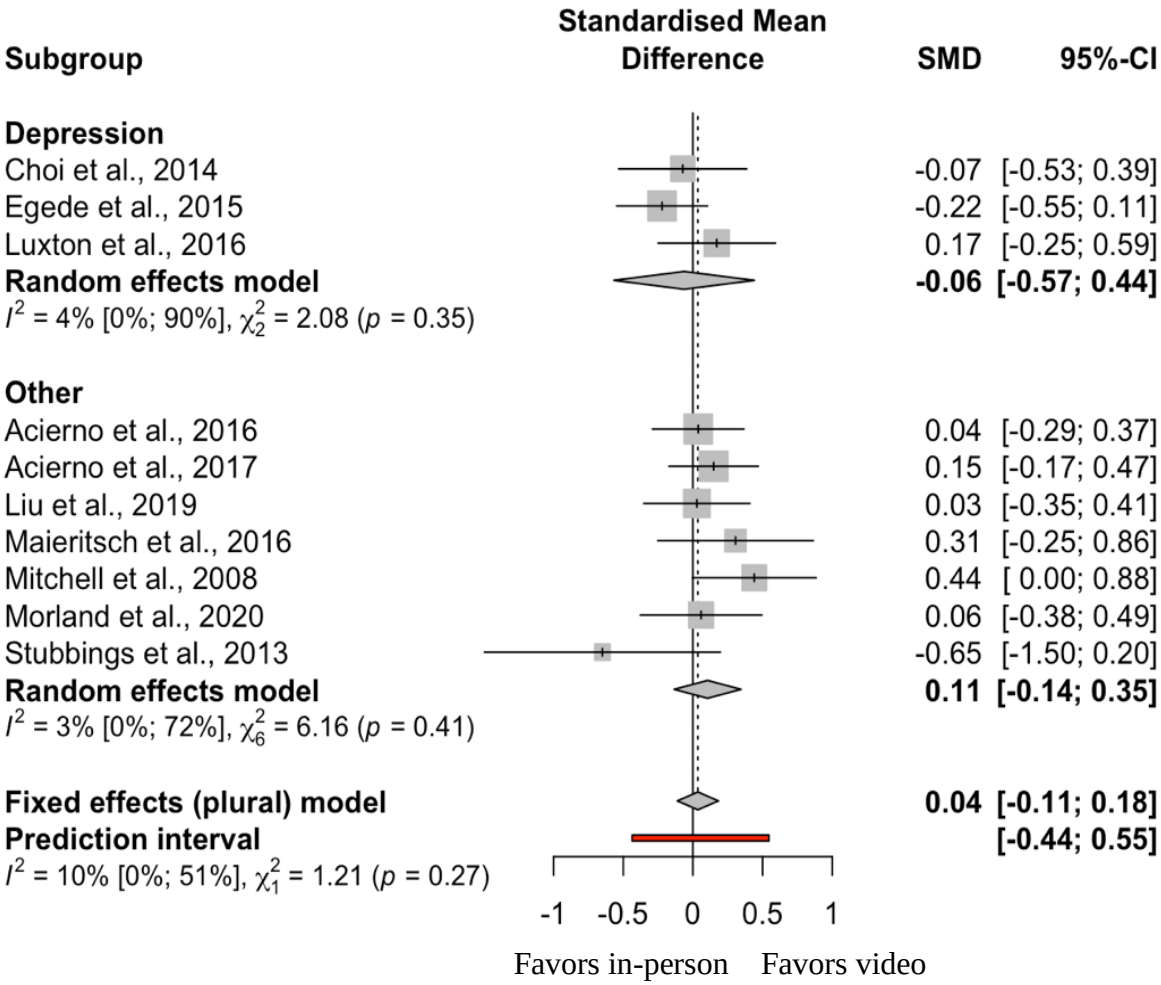


Figure 7

Subgroup Attrition Rate Forest Plot

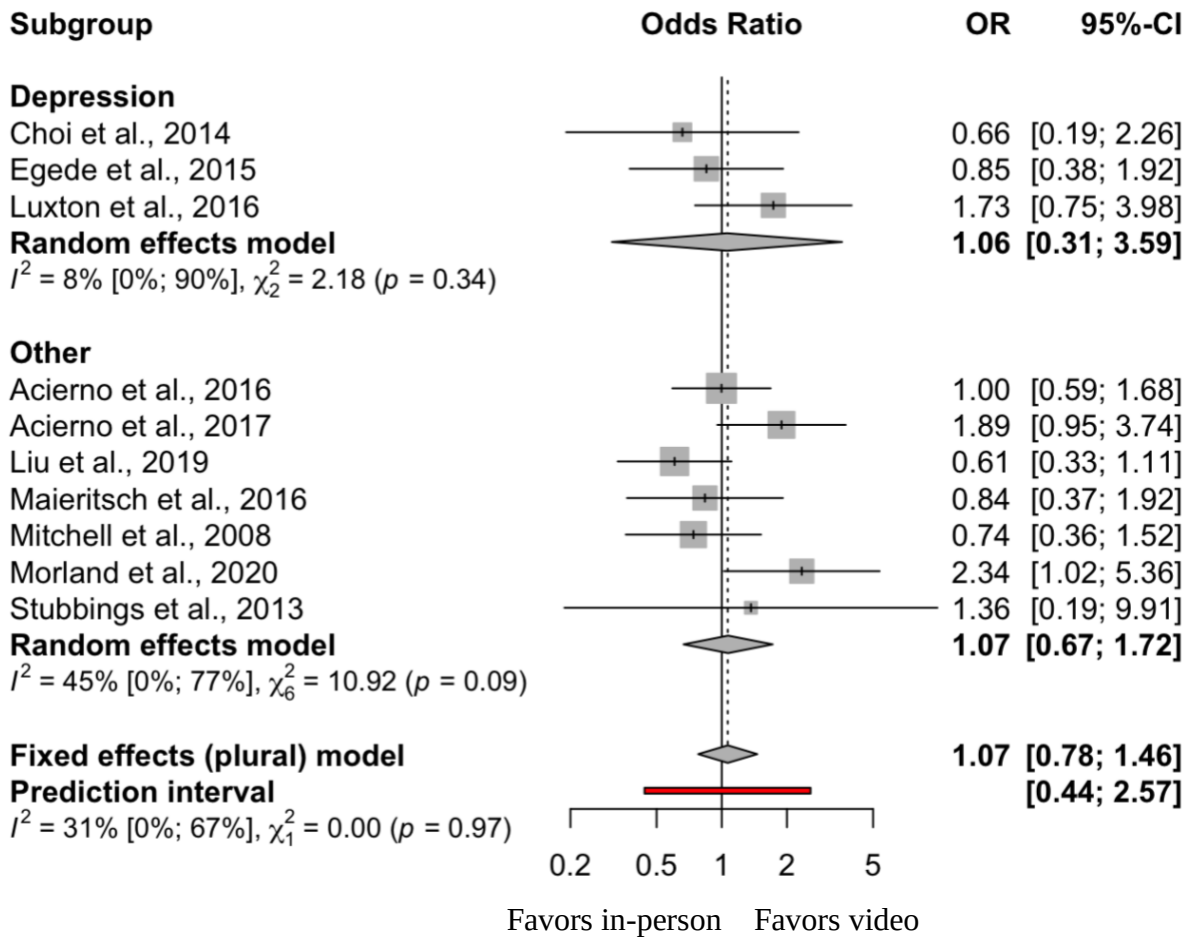


Figure 8

Risk of Bias Summary Plot

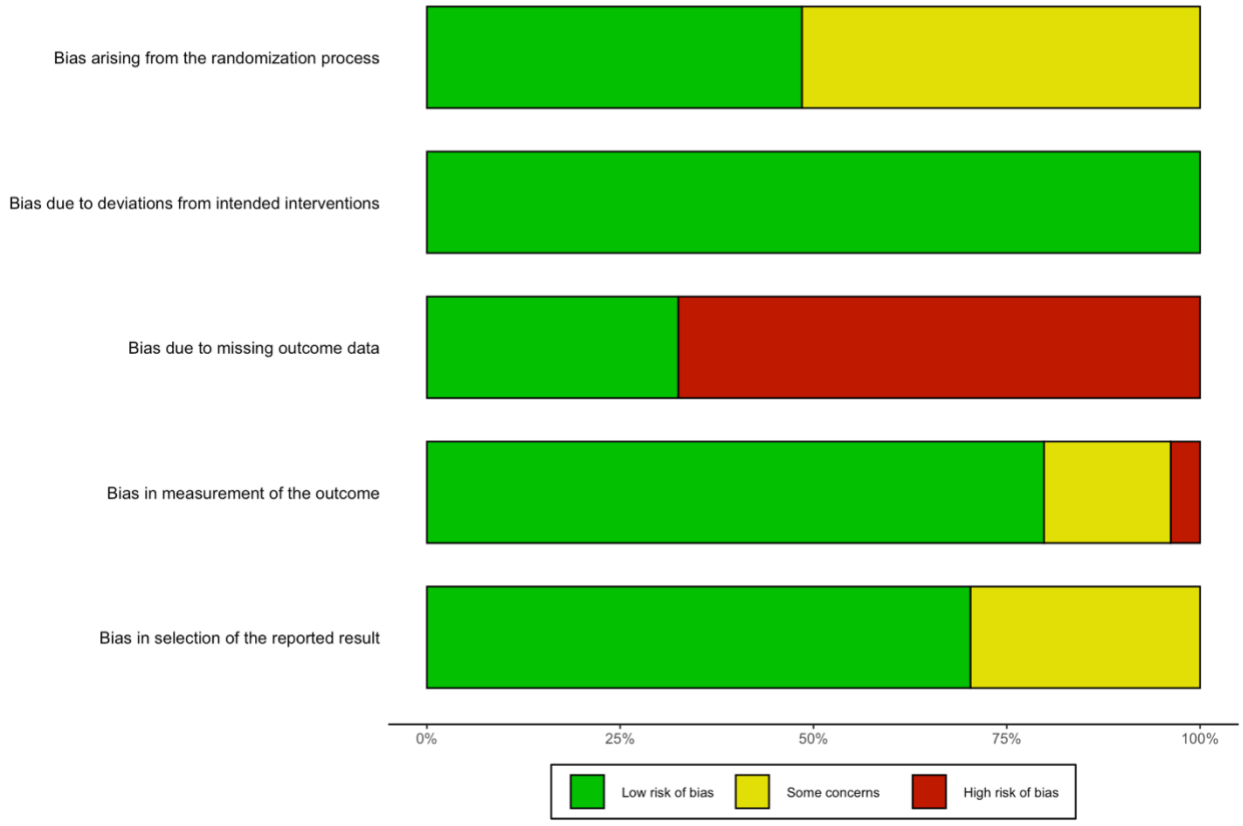


Figure 9

Risk of Bias Domain Assessment

Table 2

GRADE Quality of Evidence

Quality Assessment						Participants (n)		Effect size (95% CI)	Quality
Outcome (n)	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	F2F	Video		
Efficacy (depressive symptoms) n = 1009	Randomized trials	Serious	Not serious	Not serious	Not serious	511	498	*g* = 0.05[a] (-0.12, 0.23)	■■■○ Moderate
Attrition n = 1429	Randomized trials	Serious	Not serious	Not serious	Serious	712	717	OR =1.06[a] (0.75, 1.50)	■■○○ Low

Note. Quality Moderate – moderate quality of evidence to support effect size confidence; Quality Low – limited quality of evidence to support effect size confidence; F2F – face-to-face/in-person condition; Video – videoconferencing-based condition; CI – confidence interval; [a] – positive value favors video-based condition.

Appendix A

Search strategy

‘‘Psychotherapy’’ OR ‘‘Counseling’’ OR counsel* OR psychotherap* OR therapy OR therapies OR therapeutic*

AND

telemedicine* OR ‘‘tele medicine’’ OR teleconsultation OR ‘‘tele consultation’’ OR ‘‘tele consulting’’ OR ‘‘tele counseling’’ OR telehealth* OR ‘‘tele healthcare’’ OR ‘‘tele medical’’ OR telemental* OR telemedical* OR ‘‘tele mental’’ OR ‘‘tele psychotherapy’’ OR telepsycholog* OR telepsychotherapy OR ‘‘video conference’’ OR ‘‘video conferences’’ OR ‘‘video conferencing’’ OR videoconferenc* OR ‘‘video therapy” OR “telebehavioral health” OR telebehavioral*

AND

‘‘Depression’’ OR ‘‘Depressive Disorder’’ OR depress* OR dysthymi* OR ‘‘premenstrual dysphoric disorder’’ OR ‘‘Seasonal Affective Disorder’’

Sort by 2000/01/01’’ – ‘‘05/1/2020’’ AND English

Search strategy adapted from Berryhill et al., 2019