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REVIEW ARTICLE

A review of evaluation approaches for telemental health programs

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ABSTRACT

Purpose: Although studies have examined the effectiveness of telemental health programs, optimal approaches for their evaluation remain unclear. We sought to review the outcomes used to evaluate telemental health programs.

Methods: We conducted a literature search in PubMed and Google Scholar for peer-reviewed studies published between January 2010 until October 2019, and we excluded review articles, opinion papers, presentations, abstracts, and program report without data.

Results: 1310 articles were identified, 34 of which were reviewed. Studies used a combination of non-clinical and clinical outcomes, most commonly engagement and impact rates, and standardised clinical measures. Very few studies examined technological feasibility, cost-effectiveness, and qualitative satisfaction reports.

Conclusions: This review is the first to summarise approaches to evaluate telemental health programs. Strengths and weaknesses of the evaluation outcomes are discussed in this review, highlighting essential factors that should be taken into consideration when developing a standardised framework for the evaluation of future telemental health programs.

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Telepsychiatry; outcome measures; quality; program evaluation; telemental health

KEY POINTS

- The methods used to evaluate telemental health programs are varied and no gold-standard for measurement of success exists.
- Clinical and non-clinical outcomes are being used to evaluate telemental health programs.
- More emphasis should be placed on feasibility measures such as cost-effectiveness.
- Therapeutic alliance should be a crucial part of evaluation of any telemental health program.
- Longer follow up times and larger sample sizes, as well as more diverse populations, are needed to generalise outcomes.
- Utilisation of clinical tools to assess success should be limited to standardised measures commonly used in clinical practice.

Introduction

Most patients with mental health conditions are not able to receive the treatment they need (Deslich et al. 2013). This limited access to mental health care has been attributed to multiple reasons such as shortages and maldistribution of mental health specialists, transportation and logistical challenges, and insufficient funding to sustain public mental health programs among others (Kessler et al. 2005; Coverage 2019). Developments in communication technologies have made it possible to increase access to health care using real-time videoconferencing that allows clinicians and patients at different locations to interact as if meeting in the clinic (Diamond and Bloch 2010). Telemental health, also known as telepsychiatry, is the use of communications and information technologies, including videoconference, to deliver remote mental health services, including psychotherapy and medication management, in either synchronous or asynchronous means (Mair and Whitten 2000; Norman 2006; Mahmoud et al. 2019). While synchronous (e.g., real-time) videoconferencing is a hallmark of telemental health, other technologies and methods of communications fall under the definition of telemental health, including the remote use of electronic health records, telephone communication, electronic fax, encrypted emails, and digital health applications (Deslich et al. 2013). Telemental health requires little shifting of workflows or adjustment to provide the proper care that is comparable to the conventional in-person care (O'Reilly et al. 2007). This flexibility has placed telemental health on the map as a useful alternative – and at times the only option – to office visits for patients who cannot access needed care and addresses multiple other barriers to accessing treatment (Whaibeh et al. 2020). Telemental health adoption has witnessed significant growth in the United States over the past few years (Vogt et al. 2019; Mahmoud, Vogt, et al. 2020; Mahmoud, Whaibeh, et al. 2020). This has been attributed to the increased demand for mental health services, uneven distribution of psychiatrists and other mental health professionals, improvement in internet connectivity, and increased acceptability of technology in healthcare delivery (Wang and Alexander 2014; Chan et al. 2015). In addition, studies on telemental health have been conducted in multiple countries across different continents (Germain et al. 2010; Van Bastelaar et al. 2010; Marchand et al. 2011; Xie et al. 2013; Hungerbuehler

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et al. 2016; Tarp et al. 2017). A large body of evidence shows that telemental health is well accepted by patients of distinct backgrounds and ages and that it provides clinical outcomes comparable to in-person services (Ruskin et al. 2004). This has been demonstrated across different mental health conditions, and in multiple clinical settings, such as community, correctional, residential, institutional, and school settings (Davis et al. 2013; Lichstein et al. 2013; Choi et al. 2014; King et al. 2014; Seritan et al. 2019). In addition, services successfully delivered via telemental health have included psychotherapy, psychiatric evaluations, psychiatric medication management, consultation services, and psychoeducation (Hubley et al. 2016). Moreover, the literature shows that the therapeutic alliance in telemental health treatment is not compromised (Germain et al. 2010; Hungerbuehler et al. 2016; Kocsis and Yellowlees 2018). Beyond clinical efficacy, there is also evidence for telemental health as a cost-effective method of healthcare delivery that can be associated with significant cost savings (Davis et al. 2013; Lichstein et al. 2013; Choi et al. 2014; King et al. 2014; Seritan et al. 2019). Telemental health has the support of professional societies such as the American Psychiatric Association and American Telemedicine Association, with already established guidelines and best practices (Turvey et al. 2013; APA 2018; Shore et al. 2018).

Despite all of that, very little work has been done regarding developing a standardised framework for evaluation of telemental health services, and this is needed to enhance comparability of outcomes across settings and to improve the services. As adoption increases and the implementation of telemental health programs scales up, it becomes necessary to examine how telemental health has been evaluated in the literature. This is an important step to identify approaches that have been utilised to track the outcomes of telemental health programs. There is an urgent need for a comprehensive review of evaluation approaches used in telemental health that identifies common strengths and weaknesses of related programs. The purpose of this paper is to review the clinical and non-clinical measures of outcomes used to evaluate telemental health programs.

Methods

Search strategy

A review of the literature was conducted from July 2019 to October 2019, using the databases PubMed and Google Scholar. Because a 10-year cut-off is usually recommended according to the Best Evidence Medical Education (BEME) collaboration for search strategies in literature reviews, we only included original articles from January 2010 onwards (BEME, 2020). The search aimed to identify articles that examined and evaluated the use of telemental health delivery including psychiatric assessment, diagnosis, treatment, and follow-up, as well as psychotherapy, when delivered via videoconferencing, be it synchronous or asynchronous. In addition the search aimed to identify articles assessing the delivery of telemental health via mobile applications, teleconferencing systems, Internet-based therapies, and software developed for videoconferencing calls. The literature search terms included 'outcomes', 'telepsychiatry', 'telemental health', 'videoconferencing', 'measures', 'effectiveness', and 'telepsychiatry measures' (see Table 1). In addition to that, the list of references from published review articles in telemental health were manually searched to find studies that might have been missed in the database search. As a definition, indicators of non-clinical outcomes refer to measures of process, feasibility, and public health impact at program level such as those used to evaluate non-mental health related aspects of the telemental health practice (e.g., cost-effectiveness, volume of patients served etc ...), whereas indicators of clinical outcomes refer to measures of healthcare outcomes related to telemental health programs (e.g., symptoms changes, lab results, etc ...).

Table 1. Search terms.

Search string 1	'telepsychiatry' AND 'outcomes'
Search string 2	'telepsychiatry' OR 'telemental health' AND 'outcomes'
Search string 3	'video conferencing' OR 'telepsychiatry' AND 'measures'
Search string 4	'telepsychiatry' OR 'telemental health' OR 'effectiveness'
Search string 5	'telepsychiatry' OR 'telemental health' AND 'telepsychiatry measures'

Inclusion & exclusion criteria

Included articles were peer-reviewed Randomised Control Trials (RCT), case studies, quantitative and retrospective reports published between January 2010 until October 2019, written in English, and that addressed the effectiveness of a telemental health program. The terms 'telepsychiatry' and 'telemental health' – used interchangeably – were defined to include any type of mental health treatment in a setting where the clinician and patient are situated in different geographical locations. Exclusion criteria included review articles, opinion articles, descriptive reports without data, poster presentations, conference abstracts, and program descriptions. For RCTs, control groups in RCT included patients on either a waiting list or treatment as usual. Studies without a control group or with very specific subpopulations were deemed relevant to the feasibility, sustainability, and effectiveness of telemental health, because they provided data not well addressed in the literature. They also provided additional insights into reports of mental health care.

Data collection and management

Two authors (MH and MT) conducted the search process, screened the articles, and extracted the data. The title of the articles and abstracts were reviewed for relevance, and then the full text version of the selected studies was read in detail to determine inclusion. From each included study, data such as purpose or research questions, research design, and findings related to the review paper were extracted. A pre-established Excel data sheet was prepared for data extraction, synthesis, and analysis. We extracted the following variables from each included study: type of study, reported intervention and treatment, routine statistical numbers such as number of patients served and number of sessions conducted, type of psychotherapy, type of telemental health modality (synchronous or asynchronous), clinical outcomes, assessment tool for clinical outcomes, non-clinical outcomes, measurement of non-clinical outcomes, advantages, disadvantages, and limitations. Given our focus on summarising and appraising the studies' evaluation approaches, we followed a descriptive reporting approach and analysis of the data.

Results

General findings

A total of 1310 papers were retrieved, 34 of which met the set inclusion criteria. Included studies had reported examining the outcomes of a telemental health program, and they reflected interventions conducted in North America (United States, Canada),

Table 2. Non-clinical outcomes and the number of articles utilising them as outcome measures.

Non-clinical outcomes	Number of articles ($n = 34$)
Patient engagement	
Attendance, no show rates, adherence, no attrition*	22 (64%)
Pill count	2 (6%)
Willingness to engage in treatment	1 (3%)
Impact of services	
Session length	17 (50%)
Wait time	1 (3%)
Efficient use of psychiatrist's time	1 (3%)
Non-technical Feasibility (logistical issues, transportation issues, ease and comfort with the sessions)	3 (9%)
Technical feasibility	
Technical difficulties (Internet connection quality, audio or visual problems …)	2 (6%)
Patient perception	
Satisfaction (caregiver, patient, guardian, parent)	9 (26%)
Patient perception of video conferencing (Likert Scale)	2 (6%)
Quality of services	
Collaborative work between PCP and psychiatrist	1 (3%)
Working alliance inventory	6 (18%)
Fidelity	1 (3%)
Culturally-appropriate care	1 (3%)
Agreement of control diagnosis by English and Spanish-speaking doctors	1 (3%)
Return on investment	
Monetary value, cost savings (decreased costs relating to patient, travel time, physician costs, fuel costs …)	3 (9%)

*Adherence = no attrition.

South America (Brazil), Asia (Singapore), Middle East (Israel), and Europe (Switzerland, Denmark, Netherlands). The reviewed articles included RCTs ($n = 21$), non-RCTs ($n = 2$), case studies ($n = 9$), randomised noninferiority trial ($n = 1$), and retrospective clinical records review ($n = 1$). All studies in this review included patients seeking mental health services via telemental health modality, and 12 of them examined the relationship between cultural variables, demographics, and outcomes (Davis et al. 2013; Xie et al. 2013; Yellowlees et al. 2013; Choi et al. 2014; Myers et al. 2015; Hungerbuehler et al. 2016). Because our main aim is to identify and critically appraise the outcome measures and indicators used to evaluate the efficacy of telemental health programs, we divided the outcomes of the reviewed articles into clinical and non-clinical outcomes. Of those articles, 11 reported using only non-clinical outcomes, 6 reported using only clinical outcomes, and 17 reported using both. These reflect the number of combined articles that used any of the abovementioned outcomes. Of those outcomes, 11 were assessed quantitatively, and 15 were assessed qualitatively. Reviewed articles collected data from participants in-person at the clinic where sessions for mental health services were conducted, or online from their homes at different time points including immediately post treatment, 3–6 months post treatment, or at longer durations. Further details regarding the populations addressed, the method of evaluation, the duration of follow-ups, and the outcome measures used in each study are listed in Table 4, and the full list of abbreviations can be found in Appendix 1.

Non-clinical outcomes

Non-clinical outcomes included all indicators not directly assessing the patients' mental health and related changes (see Table 2). Based on the reviewed articles, non-clinical outcomes included treatment engagement (attendance, no show rates, treatment adherence, and pill count which is a proxy measure for treatment adherance calculated by subtracting the number of pills remaining from the number of pills prescribed), impact of services (length of sessions, wait time to schedule an appointment, psychiatrist's efficiency, rating of quality of services, feasibility), technical feasibility (internet connection quality, issues with video or audio quality), patient perception (satisfaction of patients with treatment, perceptions of video conferencing quality), quality of care (collaborative work between PCP and psychiatrists, working alliance inventory, fidelity, culturally-appropriate care, validity of diagnosis between English and Spanish speaking doctors) return on investment (monetary value, cost savings). The most commonly reported indicator cluster related to patient engagement, with 64% of articles reporting the number of no show rates, adherence among others. Surprisingly, only 6% of reviewed articles reported technical issues, 26% reported including satisfaction measures, and only 9% reported returns on investment and other financial considerations.

Clinical outcomes

Clinical outcomes included all subjective and objective indicators directly assessing patient mental health and symptom changes (see Table 3). These were clustered into response to treatment (clinical standardised scores, self-reported subjective diary reports, lab-tests and other objective measures) change in total number of admissions, change in total days of hospitalisation, other standardised measures (family empowerment scale, parent and adolescent conflict, diabetes management conflict scale). Clinical standardised measures were the most used (59%) across the studies, mainly pre-and-post intervention in order to monitor changes in symptoms. Lab tests and other objective measures such as BMI were used in 15% of articles, subjective self-reported measures were used in none of the articles, and standardised measures such as family empowerment or quality of life were used in 15% of the articles.

Discussion

General discussion

The present study reviewed and critically appraised studies assessing the effectiveness of telemental health programs, by examining the outcomes and indicators they used to evaluate them. To our knowledge, this has not yet been addressed in the literature. Seeing that telemental health is a service delivery modality that is rapidly being adopted and is gaining increased attention internationally (Yellowlees et al. 2010; Shore et al. 2014; Hubley et al.

Table 3. Clinical outcomes and the number of articles utilising them as outcome measures.

Clinical outcomes	Number of articles ($n = 34$)
Response to treatment	
Standardised scores*, changes in scores	20 (59%)
Testing or measures (objective) Lab tests or objective measures (BMI, verbal testing, digit span forward and backward …)	5 (15%)
Change in total number of any hospital admissions	1 (3%)
Change in total days of hospitalisation	1 (3%)
Standardised measurement scales for General Well-being	
Family empowerment scale	2 (6%)
Quality of life and well-being scale	1 (3%)
General conflict between parents and adolescents	1 (3%)
Diabetes management specific conflict	1 (3%)

*Standardised scores include many scales that screen for mental health symptoms such as CDI, K-SADS-P, CY-BOCS, CGI-I, HAMD …

2016; Naal et al. 2020), it is crucial to investigate the manner in which such initiatives are being evaluated. This is because adequate and consistent evaluations may provide enhanced insight into the development, implementation, and sustainability of such programs. That said, we advance the literature by identifying commonly used clinical and non-clinical outcome measures, by critically appraising them, and by synthesising the findings into recommendations for evaluation. All of the reviewed studies were written in English, as we did not encounter any publications written in other languages during our search.

To this date, numerous studies have shown the benefits of telemental health as a delivery method for mental health services (Mahmoud et al. 2019). Factors such as increased cost-effectiveness, accessibility, quality of life, and engagement, among others are reported to be associated with telemental health when compared to in-person care (Hilty et al. 2014; Mahmoud et al. 2020). For example, a study on medication adherence found that utilising telehealth interventions resulted in per-patient cost savings of over $100 across 5 months, decreased travel time up to 4 h per patient, increased medication adherence, and as a result, increased their productivity (Wang and Alexander 2014). Despite the consistently reported comparable benefits of telemental health across the literature in comparison to in-person service delivery, a common consensus regarding what constitutes effectiveness and how that is measured is still not well established. That said, many of the studies examined in this review used multiple approaches that were not consistent with each other to assess the diverse domains of the clinical and non-clinical outcomes of telemental health (Radloff 1977; Mair and Whitten 2000; Nelson et al. 2003; Ruskin et al. 2004; Norman 2006; O'Reilly et al. 2007; Morland et al. 2010; Spielberger 2010; Van Bastelaar et al. 2011; Deslich et al. 2013; Xie et al. 2013; Choi et al. 2014; King et al. 2014; Shore et al. 2014; Wang and Alexander 2014; Hubley et al. 2016; Hungerbuehler et al. 2016; Tarp et al. 2017; Zheng et al. 2017). There clearly is a lack of a standardised framework for evaluating telemental health programs, which limits consistent measurements and comparisons across initiatives, and may reduce the quality and generalizability of evaluations. Overall, in this review, we divide our discussion into examining clinical and non-clinical outcomes.

Non-clinical outcomes

Most of the studies included outcomes such as volume of patients served, decrease wait lists, patient retentionamong others. These metrics are crucial to understand the breadth and reach of services, along with their effect on access to and maintenance of treatment (Mahmoud et al. 2019). Understandably so, seeing that the purpose of telemental health is to enhance access to treatment (O'Reilly et al. 2007; Diamond and Bloch 2010; Shore et al. 2014), these indicators can offer related insight, and they seemed to be widely used by reviewed studies. One aspect, however, that was not well addressed in the reviewed studies is the tele-clinician output and efficiency in delivering the services. This is important because it may serve not only as an indirect indicator for volume of patients served and wait list reduction, but also as an evaluation of how the efficiency of new workflow models utilising technology compares to in-person services delivery.

Interestingly however, despite telemental health being an innovative modality that is highly reliant on technology, only a handful of studies evaluated technical feasibility and cost-effectiveness. These are important metrics to take into consideration because they are defining features of this service modality in comparison to in-person treatment, and more attention should be placed on such indicators (Davis et al. 2013; Lichstein et al. 2013; Choi et al. 2014; King et al. 2014; Seritan et al. 2019). For example, although common justifications that support the use of telemental health are its cost effectiveness due to the integration of technology (Choi et al. 2014; Wang and Alexander 2014; Seritan et al. 2019), only a handful of the reviewed studies examined these indicators when assessing their programs and interventions. In addition, common concerns expressed by individuals regarding telemental health include doubts regarding the quality of services and the quality of the patient-clinician relationship that might be compromised because of videoconferencing (Germain et al. 2010). Other concerns such as perceived ease of use and perceived utility shape perceptions and willingness to engage in telemental health (Mahmoud et al. 2019). Accordingly, more relevant data can offer better insight into such concerns in order to inform related programs and assist in planning and implementation.

That said, and given the importance of the patient experience within healthcare and the therapeutic alliance (Scott and Stradling 1997; Germain et al. 2010; Kocsis and Yellowlees 2018), it is surprising that the reviewed studies did not place much importance on qualitative measures for patient satisfaction. Although tracking satisfaction through quantitative measures is helpful, it is also important to understand the subjective experiences of patients to enhance services, especially seeing that telemental health has not yet adopted large scale acceptance, and that satisfaction may not infer preference (Xie et al. 2013). For example, reflective commentaries addressing patient experiences, semi-structured interviews, or other open-ended evaluation forms may prove to be valuable tools for this purpose. Most of the reviewed studies included quantitative and likert-scale measures to assess patient satisfaction with services. Although they are valuable in their own right, they do not tap into the deeper subjective experiences with telemental health and may be a missed opportunity to examine the subjective components that contribute to satisfaction or lack thereof. Additionally, based on the reviewed studies, satisfaction with services was not compared across controls for comparison, and there was a lack of studies examining the relationship between patient satisfaction and other outcomes such as cultural variables, demographics, and mental health outcomes. These are important to take into consideration to better understand the factors that influence satisfaction with telemental health. For example, although culturally appropriate care is emphasised in guidelines for telemental health services (Turvey et al. 2013), and an appreciation of cultural competency when delivering care remotely is discussed in the literature (Shore et al. 2006), this

Table 4. Bibliography of reviewed articles ($n = 34$).

Author's name	Country of origin	Population studied	Duration of intervention and/or follow-up	Method of delivery	Type of study	Clinical outcome measures	Non-clinical outcome measures
Germain et al. (2010)	Canada	46 adults with PTSD	16–25 weeks (1 h a week)	VC vs in-person CBT	non-RCT	N/A	WAI, SEQ, DCCS, VTS, VT-Q
Morland et al. (2010)	USA	125 adults with PTSD	6 months	VC vs in-person CBT	RCT	STAXI-2, NAS-T	Compliance logs, frequency and quality of technical difficulties, CPOSS-VA, GTAS
Myers et al. (2015)	USA	37 children with ADHD	6 sessions over 22 weeks	VC vs in-person CBT	RCT	PHQ-9, VADRS-P, FES	PSI, CSQ
Zheng et al. (2017)	USA	100 adults with OUD	average time to achieve 30 and 90 consecutive days of abstinence, and treatment retention rates at 90 and 365 days	VC vs in-person CBT	Retrospective review	additional substance use, days of abstinence	N/A
Tse et al. (2015)	USA	37 families with children with ADHD	25 weeks	VC vs in-person CBT	RCT	VADRS, CIS, CGAS, CGI, PHQ-9, PSI, CSQ, FES	CSQ-ADHD
Rabinowitz et al. (2010)	USA	106 nursing home residents	278 telepsychiatry encounters (a total of 843.5 h (105.48-h work days)	VC vs in-person CBT	Case Study	N/A	Cost savings
Weiner et al. (2011)	USA	85 adults with memory loss	5 years with number of VC visits ranging from 1 to 8, Length of follow-up ranged from 1 month to 4.5 years	VC	non-RCT	CERAD-NB, clock drawing, WMS-III, tests of verbal fluency, DSST, CDR, GDS, NPI, physical observations	Costs, logistical issues, cultural issues
Weisman et al. (2018)	Israel	39 children with ADHD aged	8-week period	Mobile app	RCT	N/A	Pill count
Seritan et al. (2019)	USA	33 adults with movement disorders	119 telepsychiatry and 62 in-person visits with follow-up interval typically between 6 months to 1 year	VC	Case study	N/A	RACE-PD
Yellowlees et al. (2010)	USA	60 adult patients with mood disorders, or SUD, or anxiety disorders, or other axis I diagnosis	20- to 30-minute assessments	video recording	Case study	GAF	N/A
Fortney et al. (2015)	USA	364 adults with depression	18 months	VC vs in-person CBT	RCT	HSCL	SFHS, QWBS, CAHPS
Myers et al. (2015)	USA	223 children with ADHD	6 sessions over 22 weeks	VC vs in-person CBT	RCT	VADRS, VADRS-C, VADRS-T, CIS, CIS-P	N/A
Crowe et al. (2016)	USA	24 deaf adults with chronic mental illnesses	weekly or biweekly, 30- or 60-min sessions	VC vs in-person CBT	RCT	OMS	patient satisfaction
Cullum et al. (2014)	USA	202 adults with cognitive impairment	One session	VC vs in-person CBT	RCT	MMSE, HVLT-R, letter fluency, FAS, category fluency, BNT, Digit Span forward and backward, Clock Drawing Test	N/A
Hungerbuehler et al. (2016)	Brazil	107 adults with depression	6- and 12-month follow-up	VC vs in-person CBT	RCT	MMAS-4, CSQ-8, WAI-S	satisfaction with treatment, therapeutic relationship, treatment adherence (appointment compliance and dropouts), and medication adherence

(*continued*)

Table 4. Continued.

Author's name	Country of origin	Population studied	Duration of intervention and/or follow-up	Method of delivery	Type of study	Clinical outcome measures	Non-clinical outcome measures
Tarp et al. (2017)	Denmark	71 patients with alcohol use disorders	follow-up at 3, 6, and 12 months	VC vs in-person CBT	RCT	N/A	Dropout rates, treatment completion
Yellowlees et al. (2018)	USA	158 patients with mood disorders, substance abuse, anxiety disorders	5 years	asynchronous vs synchronous	Case Studies in RCT	N/A	Wait time, efficient use of psychiatrist's time, collaborative work between PCP and psychiatrist
Yellowlees et al. (2013)	USA	24 patients with axis I disorders	one session	asynchronous	Case Studies	N/A	SCID-I
Storch et al. (2011)	USA	31 youths with OCD	3-month follow-up	VC vs in-person CBT	RCT	CY-BOCS, CGI-I	Patient satisfaction
Godleski et al. (2012)	USA	98,609 adults with mental illnesses	4 years	VC	RCT	Number of admissions, number of hospitalisation days	N/A
Choi et al. (2014)	USA	158 patients with depression	6 months	VC	RCT	HRSD, WHODAS	Session length
Lichstein et al. (2013)	USA	5 patients with insomnia and depression	10 sessions and 2-month follow-up	VC	case studies	CSD, ISI, HRSD	Developed own questionnaire
Van Bastelaar et al. (2011)	Netherlands	255 diabetic adult patients with depressive symptoms	1-month follow-up	VC	RCT	CES-D	Diabetes specific stress and glycemic control
Mohr et al. (2013)	USA	101 patients with MDD	12 weeks	Online platform	RCT	PHQ-9, MINI	Adherence
Himle et al. (2012)	USA	20 children with tic disorders	4-month follow-up	VC vs in-person CBT	RCT	YGTSS	CGI-S, CGI-I, PTQ
Comer et al. (2014)	USA	5 children with OCD	12 sessions across 14 weeks of treatment	VC	case-series	CGAS, CY-BOCS	CSQ–8
Marchand et al. (2011)	Canada	36 patients with PTSD	16–25 weeks and a 6-month follow-up	VC vs in-person CBT	RCT	MPSS, BDI–II	N/A
Xie et al. (2013)	Singapore	22 adults with ADHD	One session per week for 10 weeks total	VC vs in-person CBT	RCT	VADRS-P, PRQ-CA, CGACS, CGI-S, CGI-I	Usefulness of program
Jacob et al. (2012)	USA	15 children with varying diagnoses	2 sessions	Telepsychiatry consultation clinic	Case Study	N/A	Parent satisfaction
Davis et al. (2013)	USA	58 rural children with obesity	8 weekly sessions with additional 6 months during the follow-up period	VC vs in-person CBT	RCT	Child BMI, 24-hr dietary recalls, accelerometer data, child behaviour checklist, BPFA-S	Feasibility, fidelity, attendance
Freeman et al. (2013)	USA	71 adolescents with poorly controlled DM	10 sessions	VC vs in-person CBT	RCT	N/A	WAI, CBQ-20, DRFC
Hommel et al. (2013)	USA	9 adolescents with IBD	one session	VC	Case Study	PUCAI, p-HBI	Pill count, feasibility
King et al. (2014)	USA	85 OTP adults	12 weeks of weekly individual counselling	VC vs in-person CBT	RCT	N/A	CSQ, HAQ-II, MCP
Ertelt et al. (2011)	USA	116 adults with BN or eating disorder	data collected at 2, 8, and 16 weeks of treatment	VC vs in-person CBT	RCT	N/A	WAI

issue remains not well explored, and this represents an important avenue for future research.

Clinical outcomes

Although non-clinical outcomes were the main outcomes used in the reviewed studies as indicators, the commonly used clinical outcomes included standardised scales administered pre-and-post intervention to monitor changes in symptoms, laboratory testing measures, and general well-being measures. Not surprisingly, given that one of the main purposes of mental health treatment is to manage and reduce symptoms (Coverage 2019; Kessler et al. 2005), almost all studies examined changes in symptoms using standardised clinical and screening instruments. While this area seems to be well-addressed by the reviewed studies, it may be important to use standardised screening and clinical tools that are more commonly used by clinicians such as the Patient Health Questionnaire- 9 and Generalised Anxiety Disorder- 7 in order to align research with clinical practice. Additionally, it is important for future programs to focus on collecting hospitalisation data as clinical outcomes since very few of the reviewed studies did that. For example, this can include rates of emergency admissions and re-admissions.

Implications and recommendations

In this review, we examined studies reporting the outcomes of telemental health programs and interventions. Specifically, we identified and critiqued the outcome measures and indicators used in those studies with the aim of synthesising their strengths and weaknesses, and ultimately of recommending improvements for the evaluation of future initiatives. As such, we divided the outcomes into clinical and non-clinical ones. A strong point of the non-clinical outcomes used for the evaluation of the reviewed studies is that they focussed on examining the patient adherence to treatment by using metrics such as no show rates, adherence, and attrition among others. In terms of the clinical outcomes, a strong point is their focus on using standardised clinical and screening measures to track changes in patient symptoms. However, we also found significant weaknesses in the evaluations of reviewed studies that could be addressed to improve the practice and knowledge-base associated with telemental health.

First, it is crucial for future studies to enhance the evaluation of outcomes associated with the defining features of telemental health and that support the rationale behind its use. There is an urgent need to place more emphasis on feasibility measures such as cost-effectiveness which should incorporate costs associated with technology infrastructure, clinician compensation, internet connectivity, and hardware as well as software costs. Cost-effectiveness should also incorporate factors such as insurance reimbursement rates, grants, and other sources of funding. Projections on patient utilisation, the concomitant avoidance of patient leakage, and the subsequent ability to bill for ancillary and non-mental health services through increased patient retention would need to be factored in. This is because telemental health is mainly adopted to enhance access to treatment, and the evaluation of such aspects are important to support this argument and to encourage its adoption across different settings. Also, because of the varying degrees of funding, resources and readiness that different healthcare systems might have when considering telemental health, it is important to examine such differences and approaches to facilitating its adoption in more challenging settings.

Second, the patient-clinician relationship, sometimes known as the therapeutic alliance, is a strong predictor of success in healthcare (Kelley et al. 2014), and individuals customarily tend to express scepticism towards using telemental health services, for fear of compromising the quality of their interactions with clinicians (Germain et al. 2010). For this reason, it is important to better understand the experiences of patients receiving telemental health services, using measures beyond quantitative satisfaction surveys, in order to optimise their delivery. We found that very little studies used qualitative approaches to understand these experiences, including perceptions of and experiences with the therapeutic alliance, satisfaction with the technology and satisfaction with the overall experience of healthcare services. Therefore, we recommend for future initiatives to address this by using semi-structured interviews, focus groups, open-ended surveys, or other qualitative measures that can also be standardised to ensure consistency across studies. This could offer deeper insights into the sources of satisfaction and dissatisfaction with the services, that could funnel into improving them and ultimately enhancing the services. Also, this may help in the development of more refined approaches to measure satisfaction as a multi-faceted and complex construct. An additional point here is for future studies to investigate the relationship between psychological symptoms, patient demographics, and satisfaction with telemental health.

Third, although most of the studies used standardised screening and clinical instruments to track symptoms and other well-being measures, we found that a wide variety of instruments were used. In order to better align research with practice, we recommend for future studies and related interventions to use tools commonly used in clinical practice (Chenneville et al. 2019; Johnson et al. 2019).

Fourth, we found that the reviewed studies had significant weaknesses regarding the diversity of population groups, the small sample sizes, the lack of control groups, and the short-term duration of their evaluations, which we recommend for future studies to better address. Longer follow-up times are important to factor into evaluations because the use of technology may bring about initial excitement associated with novelty, and which may influence measured outcomes. Therefore, longer follow-ups may allow researchers and clinicians to control for this factor. The evaluation of diverse populations and larger sample sizes are important to better understand differences in the reception and use of telemental health among diverse cultural and demographic groups, and to enhance generalizability of results. The integration of control groups in such studies are also crucial to better compare the effectiveness and other related outcomes between telemental health and in-person treatment. Several investigations of telemental health were conducted with small numbers of participants, which were often designed with limited yet somewhat adequate power. For some of those studies it was unclear whether the outcomes were statistically or clinically significant. This means that there is a need to apply evaluations on larger sample sizes. Additionally, the diversity of populations in terms of age groups and mental illness, as well as the diversity of the study designs and measures to examine telemental health represented in the published literature limits the ability to generalise outcomes (Shore et al. 2014). Accordingly, studies that examine telemental health for larger populations, longer follow up times, as well as more diverse populations are needed.

Limitations

Results of this study should be viewed in light of several limitations. Most significantly, this review may have missed important articles due to the search parameters used and the small number of databases searched, which may have influenced our recommendations. Next, telemental health includes a wide range of therapeutic modalities including medication management and psychotherapy, delivered synchronously and asynchronously. While including different therapeutic modalities under the definition of telemental health had the advantage of identifying and examining more studies, the findings in our review might not apply to all remote healthcare delivery services and our findings may have limited generalizability, and recommendations might need to be tailored to individual telemental health programs. Due to the differing approaches in which different studies examined success of telemental health programs, including the use of a wide range of clinical and non-clinical outcomes, the review does not allow for developing a standardised framework of evaluating telemental health programs.

Conclusion

Telemental health is a service delivery modality for mental health treatment that has much potential to occupy a central role in healthcare systems because of its ability to overcome common challenges associated with access to treatment. As acceptance of telemental health increases, large-scale adoption will require more sophisticated evaluations to examine and refine successful implementation and sustainability. In this study we reviewed and critiqued clinical and non-clinical indicators and outcomes used to evaluate telemental health programs with the aim of identifying common strengths and weaknesses and offering recommendations for improvement of evaluation in future initiatives. We recommend that evaluations of telemental health programs include both clinical and non-clinical components. Moving forward, we call for an increased focus on:

1. Assessing features that justify the need to use telemental health, such as cost-effectiveness, feasibility, and impact on access to service use.
2. Enhancing the measurement of satisfaction through qualitative approaches that take into consideration the priorities and needs of patient populations.
3. Using standardised clinical and screening instruments that align with clinical practice.
4. Evaluating more diverse populations, with larger sample sizes, for longer follow-up durations.

Disclosure statement

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Appendix 1. Summary of abbreviations used in the text

Acronyms/Abbreviations		Acronyms/Abbreviations	
ADHD	Attention Deficit Hyperactivity Disorder	MINI	Mini International Neuropsychiatric Interview
BDI-II	The Beck Depression Inventory–Second Edition	MMAS-4	Morisky Medication Adherence Scale-4
BN	Bulimia Nervosa	MMSE	Mini-Mental State Examination
BNT	Boston Naming Test	MPSS	The Modified PTSD Symptom Scale
BPFA-S	Behavioural Paediatrics Feeding Assessment Scale	NAS-T	Novaco Anger Scale Total Score
CAHPS	Consumer Assessment of Healthcare Providers and Systems	NPI	Neuropsychiatric Inventory
CBQ-20	Conflict Behaviour Questionnaire	OCD	Obsessive Compulsive Disorder
CBT	Cognitive Behavioural Therapy	OMS	Outcomes Measurement System Adult Questionnaire
CDR	Clinical Dementia Rating	OTP	Opioid Treatment Program
CERAD-NB	The Consortium to Establish a Registry for Alzheimer's Disease neuropsychological battery	OUD	Opioid Use Disorder
CES-D	Center for Epidemiological Studies-Depression Scale	p-HBI	Partial Harvey-Bradshaw Index
CGAS	Children's Global Assessment Scale	PCP	Primary Care Physician
CGI	Clinical Global Impression	PHQ-9	Patient Health Questionnaire-9
CGI-I	Clinician Global Impression-Improvement Scales	PRQ-CA	Parent-Rated Parenting Relationship Questionnaire
CGI-S	Clinical Global Impression – Severity Scale	PSI	Parenting Stress Index
CIS	Columbia Impairment Scale	PTQ	Parent Tic Questionnaire
CPOSS-VA	Charleston Psychiatric Outpatient Satisfaction Scale-VA	PTSD	Post-Traumatic Stress Disorder
CSD	Children's Social Desirability Scale	PUCAI	Pediatric Ulcerative Colitis Activity Index
CSQ	Caregiver Strain Questionnaire	QWBS	Quality of Well-Being Scale
CSQ-8	Caregiver Strain Questionnaire-8	RACE-PD	Remote Access to Care, Everywhere, for Parkinson Disease
CSQ-ADHD	Caregiver Strain Questionnaire-Attention Deficit Hyperactivity Disorder	RCT	Randomised Control Trial
CY-BOCS	Children's Yale-Brown Obsessive Compulsive Scale	SCID-I	Structured Clinical Interview for DSM-IV Axis I Disorders
DCCS	Distance Communication Comfort Scale	SEQ	Session Evaluation Questionnaire
DM	Diabetes Mellitus	SFHS	Short Form Health Survey
DRFC	Diabetes-Management Specific Conflict Measured via Diabetes Responsibility and Family Conflict Scale	STAXI-2	State-Trait Anger Expression Inventory-2
DSST	Digit Symbol Substitution Test	SUD	Substance Use Disorders
FES	Family Empowerment Scale	VADRS	Vanderbilt ADHD Diagnostic Parent Rating Scale
GAF	Global Assessment of Functioning	VADRS-C	Vanderbilt ADHD Diagnostic Parent Rating Scale-Caregiver version
GDS	Geriatric Depression Scale	VADRS-P	Vanderbilt ADHD Diagnostic Parent Rating Scale-parent version
GTAS	Group Therapy Alliance Scale	VADRS-T	Vanderbilt ADHD Diagnostic Parent Rating Scale-Teacher version
HAQ-II	Helping Alliance Questionnaire-Second version	VC	Video Conference
HRSD	The Hamilton Rating Scale for Depression	VT-Q	Videoconference Therapy Questionnaire
HSCL	Hopkins Symptom Checklist	VTS	Videoconferencing Telepresence Scale
HVLT-R	Hopkins Verbal Learning Test-Revised	WAI	Working Alliance Inventory
IBD	Inflammatory Bowel Disease	WAI-S	Working Alliance Inventory-short version
ISI	Insomnia Severity Index	WHODAS	World Health Organisation Disability Assessment Schedule
MCP	Multiple Choice Procedure questionnaire	WMS-III	Wechsler Memory Scale-III
MDD	Major Depressive Disorder	YGTSS	Yale Global Tic Severity Scale