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Telemedicine for Mental Disorders: A Review of Treatment Outcomes, Patient Satisfaction, and Reliability Comparisons with In-Person Care

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Abstract

Introduction: Many individuals suffering from mental illnesses remain undiagnosed due to accessibility barriers. Emerging trends in telemedicine offer innovative solutions to these challenges: remote healthcare delivery such as videoconferencing eliminates the effort and cost of commuting, allowing patients access to mental health care from the comfort of their homes. This literature review examined patients meeting diagnosis criteria for a mental disorder and receiving treatment either in-person or online, with the goal of comparing treatment outcomes, satisfaction, and reliability.

Methods: We conducted a comprehensive literature search directly related to telemedicine as a treatment to mental disorders using PubMed databases, Embase, MEDLINE, and Web of Science databases between database inception to February 2023. All peer-reviewed manuscripts on outcome, reliability, and patient satisfaction on the topic were included. Secondary research, cross-benefit analyses, and summaries of trends were excluded. The results of each study, intervention methods, demographic, and attrition were summarized on Excel.

Results: Out of 2034 articles found in the literature search conducted on PubMed, Embase, MEDLINE, and Web of Science databases between inception and February 2023, 25 studies that directly relate to telemedicine as a treatment for mental disorders were included. Most of them found no significant differences in outcome and satisfaction between both delivery modalities. Two studies examined the inter-rater reliability of diagnoses between delivery methods, but one reported no significant differences while the other found a significantly higher correlation between the scores of two raters for telemedicine patients.

Discussion: The current literature suggest that telemedicine is at least comparable to in-person healthcare in terms of outcome, as most of the reviewed studies found insignificant differences between the two delivery modalities. However, inter-rater reliability of psychiatric interviews using telemedicine and in-person modalities remain uncertain due to the limited number of studies on the topic and the contradicting results of the two papers addressing this issue.

Conclusion: Telemedicine may serve as a cost-effective and time-saving method for interventions that do not require the patient to be on-site. Further research comparing clinical interviews and diagnoses between raters from both modalities should be conducted to establish a larger body of evidence on reliability.

Keywords: telemedicine; mental health service; mental disorder

Introduction

The increasing prevalence of mental health issues is a pervasive global issue that significantly impact the lives of individuals and its burden on society. According to the World Health Organization, approximately 13% of the global population is living with mental disorders, which is 25% more than the figure from 2000 [1]. At some point in their lives, 1 in 4 individuals will be affected by mental disorders, in which its conditions often require timely and effective interventions to mitigate their negative impact and improve outcomes [1]. However, despite its prevalence and the challenges faced by its victims, some individuals may be unable to seek help due to accessibility barriers. Fortunately, remote diagnoses and mental health treatments via information and telecommunication technologies has established itself as a promising solution to overcome these barriers as more insurers pay for e-health services in recent years. A growing body of literature on telepsychiatry (TP) now investigate the implementation of such services, the majority of which suggest that they have the potential to play an important role in increasing access to underserved individuals [2]. There is also growing evidence supporting its reliability, cost-efficiency, and efficacy, which has increased global interest in this method of care delivery [3].

These innovative approaches could be the first steps in overcoming numerous barriers in providing mental healthcare to those in need. Current research suggests that telemedicine and in-person (IP) treatment are generally comparable and consistent, indicating some level of positive treatment outcome, patient satisfaction, and

noninferiority of virtual health care. These patterns highlight the potential of telepsychiatry as a simpler and convenient alternative to traditional psychiatric interventions, with the potential to alleviate the global burden of mental disorders and bring about a better overall well-being for individuals affected.

Given its cost-effectiveness, the purpose of the following literature review is to examine whether telepsychiatry is the silver bullet to solving the global burden of mental disorders, by thoroughly reviewing the efficacy and reliability of various telepsychiatry delivery methods for patients meeting diagnostic criteria. To cover both controlled clinical trials and real-world patient data, randomized trials and retrospective studies were reviewed. The perceived effectiveness and satisfaction of patients receiving such treatments were also evaluated to provide an indicator of how patients were experiencing the treatment modalities. This paper identifies the main method of delivering virtual health care in each study and presents an overview of patient outcomes before and after intervention, patient satisfaction with their treatment delivery, and the reliability of clinical interviews for both online and offline modalities.

Methods

Search Strategy

A comprehensive search on PubMed databases, Embase, MEDLINE, and Web of Science databases between database inception and February 2023 was conducted to identify relevant articles. The following search terms were used: “telemedicine”, “therapy” or “mental health service” or “psychotherapy”, and “mental disorder” or “mental illness”. The search terms were chosen based on their relevance to the topic of telepsychiatry and the review’s purpose of examining the effect of telepsychiatry on patients with mental disorders. Some pluralization and rewording strategies such as Boolean operators and truncation were used to capture a broader range of relevant articles. Publication date, publication type, and language were not limited. A detailed version of the search terms can be seen in Appendix A.

Selection Process

The initial search of 3408 articles were narrowed down to 2034 after removing duplicates and 25 after assessing for inclusion and exclusion in the review. Studies were included if (1) patients met diagnostic criteria for a mental disorder or was currently diagnosed, (2) measured outcomes before and after intervention, (3) treatments were administered by certified health practitioners, and (4) it examined either the efficacy, reliability, or satisfaction with telepsychiatry. Studies were excluded if they were (1) reviews, (2) cost analyses, (3) summary of telepsychiatry trends, (4) study protocols, (5) if patients did not receive treatment, or (6) if the intervention groups were health providers instead of mental health patients.

The exclusion of certain study designs, such as cost-benefit analyses was due to their inability to provide clear evidence on treatment outcomes of telepsychiatry. The review’s population of interest were specifically patients meeting diagnostic criteria or was already diagnosed with mental disorders, who also received psychiatric intervention for the duration of the studies. This specificity was to ensure the relevance and applicability of the findings to mental health care for patients in need — studies that involve healthy participants or those that had no psychiatric intervention may introduce confounding factors that affect the validity of the results. Lastly, the exclusion of studies not delivered by certified health practitioners was to ensure the results accurately reflect the standard of care in psychiatry practice.

Data Extraction

The eligibility of studies was considered based on the inclusion and exclusion criteria. For the remaining 25 articles, information extracted from each article included study design characteristics, sample size and demographics, treatment modality and methods, dropout rates, mean age, outcomes assessed in the form of patient satisfaction and treatment outcomes, as well as other descriptive information relevant to the context of each study.

Variables were created in an Excel spreadsheet for: (1) last name of the first author and publication year, (2) dummy variable — which indicates the presence or absence of a characteristic with the values of 0 and 1 — for non-inferiority trial, (3) dummy variable for the inclusion of a self-assessment in outcome measures, (4) dummy variable if there were pre-post measurements, (5) dummy variable for retrospective studies, (6) dummy variable if the study is evaluating inter-rater reliability, (7) dummy variable for the use of random participant assignment, (8) delivery method of the telehealth group, (9) delivery method of the control group, (10) demographic information, including the number of participants, types of disorders, and participant selection criteria, (11) dropout rates if available, (12) mean age of participants, (13) general findings, and (14) relevant information pertaining to how patients were treated. Table 1 shows the variable and its definition for the information extracted. The characteristics of studies included in the review are shown on Table 2.

Table 1. Specification of Variables Excluding General Findings and Contextual Information

id	Study id, last name of first author, and year as shown on Covidence
noninf	Dummy variable for noninferiority trial, taking only the values of 1 or 0
selfassess	Dummy variable for the use of self-assessments at any point in the study
prepost	Dummy variable for pre-post study designs, where outcomes were measured before, during, and after intervention
retrospect	Dummy variable for retrospective or historic cohort studies
reliability	Dummy variable for the evaluation of treatment inter-rater reliability
random_assign	Dummy variable for the use of random participant assignment in studies
treatment	Type of telemedicinal delivery
control	Type of IP delivery
demographic	Number of participants, disorders assessed, or inclusion and exclusion criteria.
dropout	Proportion of individuals who participated during the treatment period but did not complete assessments, and thus their data were excluded for analysis. (i.e. between ITT and analysis stages).
dropout_t	Proportion of participants in the treatment group that were lost between ITT and analysis stages.
dropout_c	Proportion of participants in the control group that were lost between ITT and analysis stages.

Note: Dummy variables are used for variables pertaining to study characteristics.

Results

Article Eligibility

The total number of articles returned on PubMED, Embase, MEDLINE, and Web of Science was 3408, including duplicates across databases. Through Covidence, 1347 duplicate articles were removed, and abstracts of the remaining 2034 were screened for relevance to the literature review. Of the relevant articles, 25 were eligible according to the inclusion and exclusion criteria specified. The search strategy and selection process are detailed in Figure 1.

Outcome Measures

Comparison of treatment efficacy, reliability, and patient satisfaction between all 25 studies used a variety of outcome measures. Self-assessments to measure outcome and satisfaction were used in a total of 16 studies. The Beck Depression Index (BDI) was used in 4 studies to assess the presence and severity of depressive symptoms, and 3 studies used the Post-Traumatic Stress Disorder Checklist (PCL) to assess the presence and severity of post-traumatic stress disorder (PTSD) symptoms.

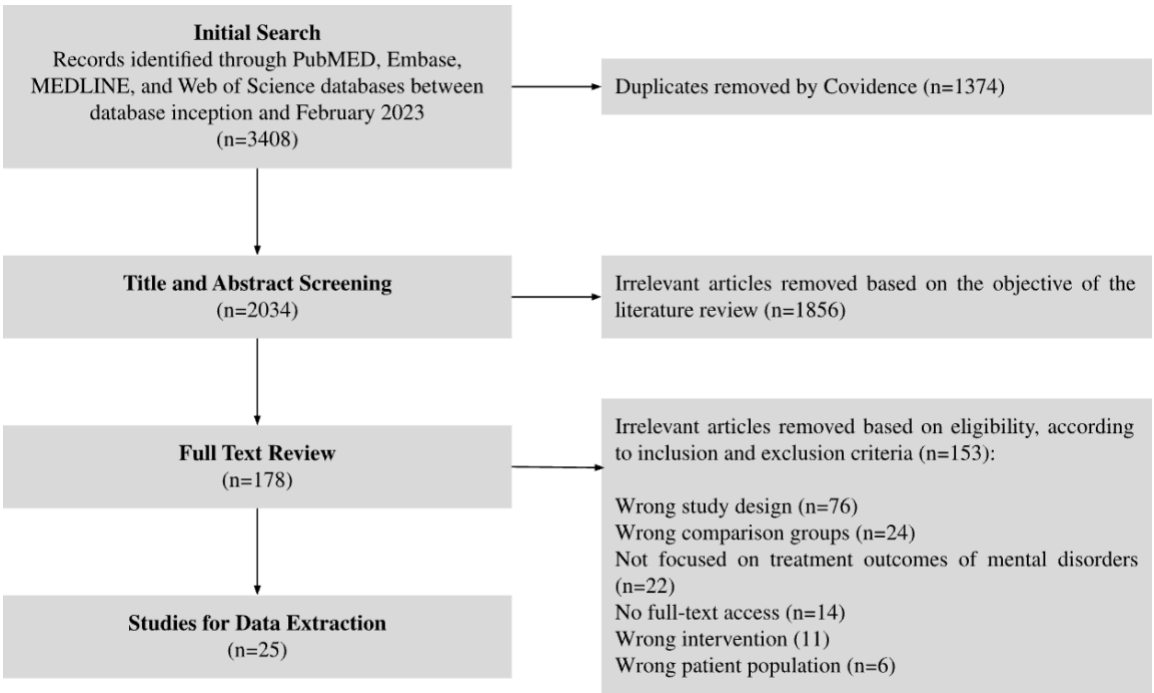

Figure 1. Selection process of articles when determining for relevancy and eligibility. Created with Google Docs.

The Alcohol Use Disorder Identification Test (AUDIT) to screen for hazardous alcohol consumption and dependence, Clinically Administered PTSD Scale (CAPS) to assess the frequency and severity of PTSD symptoms, Structured Clinical Interview for DSM-5 (SCID; Diagnostic and Statistical Manual of Mental Disorders) for making major diagnoses, and Symptom Checklist-90-R (SCL-90) to evaluate a range of psychological problems were used in 2 studies. Each of the remaining outcome measurements were used by 1 study: Brief Psychiatric Rating Scale (BPRS), Work and Social Adjustment Scale (WSAS), Suicide Behavioural Report (SBR), Medical Outcomes Study Short-Form Survey (SF-36), Rosenberg Self-Esteem Assessment (RSE), Hamilton Rating Scale for Depression (HMD-D), Vanderbilt Attention Deficit Hyperactivity Disorder (ADHD) Rating Scale (VADRS), Columbia Impairment Scale (CIS), Eating Disorder Examination Questionnaire (EDE-Q), Short Mood and Feelings Questionnaire (SMFQ), Screen for Children's Anxiety-Related Emotional Disorders (SCARED), Child Behaviour Checklist (CBCL), Telehealth Satisfaction Questionnaire (TSQ), Expected Body Weight (%EBW), Drug Abuse Screening Test (DAST-10), Beck Anxiety Inventory (BAI), and Remission from Depression Questionnaire (RDQ-M).

Symptom and Severity Outcomes

Assessments of treatment outcomes were completed for 22 studies. All participants witnessed improvements in functioning, behaviour, and symptom severity. The demographic, intervention methods, and general results of each study are listed in Table 4. Of these 22 studies, the majority of comparisons made about treatment outcomes (n=17) between the telehealth and (IP) treatment groups were comparable and did not yield any significant differences.

Significant advantages of Telehealth over the IP modality were found in 4 studies, but the differences may not hold over time and assessments may differ between raters. Dennis et al. noted that the women receiving telehealth treatment showed significantly less symptoms of postpartum depression immediately after intervention compared to those assigned to the IP group, but such differences did not hold when they were assessed again 24 weeks later [12]. Myers et al. assessing ADHD severity found that both caregiver-rated and teacher-rated assessments indicated significantly greater improvement from baseline to follow-up in the telehealth delivery group [22]. However, rater assessments differed for oppositional defiant disorder (ODD): while caregiver-rated outcomes observed improvements in inattention and ODD, teacher-rated outcomes did not indicate any significant between-group differences.

Conversely, only 2 studies found an advantage in IP intervention over virtual healthcare. Mitchell et al. observed that participants meeting criteria for binge eating disorder or bulimia nervosa (BN) assigned to clinic-based treatment had higher abstinence rates from binging and purging, and that such positive treatment effects occurred more rapidly [20]. Similarly, a positive effect of face-to-face (FTF) treatment was observed in Milosevic et al. for participants with generalized anxiety disorder (GAD), but no differences were observed for other social disorders examined in the study [19].

Patient Satisfaction

Self-assessments to measure patient satisfaction with their treatment were included in 10 studies. All 10 studies reported overall satisfaction in all participants involved. While some only reported overall satisfaction and did not make comparisons of satisfaction between telehealth and IP groups, 5 studies reported comparable satisfaction ratings between both groups, 1 study from 2001 reported significantly greater levels of satisfaction in the telehealth group, 1 study from 2015 reported the opposite effect, and the others did not compare satisfaction ratings.

Satisfaction ratings from Kopel et al. indicated that over 95% of its participants in rural New South Wales rated their service as "excellent" or "good" and were mostly satisfied with the help they had received, but the majority of its participants found face-to-face treatment "inconvenient" or "very inconvenient" to attend in comparison with videoconferencing [17]. In contrast, participants assigned to the IP group in Morland et al. rated significantly higher satisfaction scores than the telehealth group postintervention [21].

Inter-Rater Reliability

Of the 25 studies included, 2 studies compared the inter-rater reliability of clinical interviews conducted in an online versus offline setting but had contradicting results. Bistre et al. from 2022 had 2 psychiatrists clinically interview participants virtually and face-to-face, then evaluated the interviewers' agreement on the patients' psychiatric diagnoses. A complete agreement occurs when the diagnoses between the raters had given the same diagnoses, while partial agreement occurs when there were at least 1 match. Overall, the results showed that complete agreement between online and offline interviews were weak, but partial agreements were strong, and that both modalities have similar reliability. Conversely, Chae et al. from 2000 examined the correlation coefficient of BPRS scores between patients receiving telepsychiatric and clinic-based treatment, and results indicated that the correlation between 2 telepsychiatrists were significantly higher than that of their offline counterparts [10].

Dropout Rates and Study Duration

A total of 14 studies reported the total dropout rates of its participants regardless of the treatment modality they were assigned. The mean and median dropout rate of the studies were 24.4% and 21.75% respectively, indicating that there are few studies with high attrition rates. The

values ranged from 0% in Stewart et al. [24] to 53.6% in Wierwille et al. [27], but there are no observable patterns between year of publication and dropout rates. There is a negligible 0.4% higher dropout rate in the IP modality compared to telepsychiatry across all 14 studies. This finding indicates that attrition rates, represented by the proportion of participants who discontinue treatment, are comparable between both intervention modalities.

The average duration of the study between pre-treatment measures and the last post-treatment follow-up were reported in 12 studies. The mean and median study duration of the studies were 24.25 and 24 weeks respectively, ranging from a 10-week study by Yuen et al. to a 48-week study by Acierno et al. (2016) [5, 28]. While there are no observable patterns between study duration and dropout rates, Acierno et al. (2016) had a relatively lower dropout rate of 13.3% compared to 22.2% in Yuen et al. [5, 28]. The dropout rates and study durations are detailed in Table 3.

Table 2. Dummy Variables Displaying Study Characteristics of Primary Research Articles Included in the Literature Review

ID	Noninf	Selfassess	Prepost	Retrospect	Reliability	Random_Assign
Acierno et al., 2016 [5]	1	0	1	0	0	1
Acierno et al., 2021 [6]	0	0	1	0	0	1
Acierno et al., 2017 [7]	1	0	1	0	0	1
Ben-Zeev et al., 2018 [8]	0	1	1	0	0	1
Bistre et al., 2022 [9]	0	0	0	0	1	0
Chae et al., 2000 [10]	0	0	0	0	1	0
Clarke et al., 2016 [11]	0	1	1	0	1	0
Dennis et al., 2020 [12]	0	1	1	0	0	1
D'Souza et al., 2000 [13]	0	0	1	0	0	0
Stewart et al., 2017 [24]	0	1	0	0	0	0
Tutty et al., 2010 [25]	0	0	1	0	0	0
VanHuysse et al., 2023 [26]	0	0	1	1	0	0
Wierwille et al., 2016 [27]	0	1	1	0	0	0
Yuen et al., 2015 [28]	0	1	1	0	0	1
Zimmerman et al., 2022 [29]	0	1	1	0	0	0

Table 3. Dropout Rates of Participants and the Study's Duration, if indicated

ID	Total Dropout Rate (%)	Treatment Group Dropout (%)	Control Group Dropout (%)	Average Treatment Duration (Weeks)
Acierno et al., 2016 [5]	13.3	18.0	23.1	48
Acierno et al., 2021 [6]	21.3	19.0	26.0	24
Acierno et al., 2017 [7]	17.3	32.8	19.0	24
Ben-Zeev et al., 2018 [8]	10.0	42.0		24
Bistre et al., 2022 [9]	15.6		38.55	
Dennis et al., 2020 [12]	18.3	15.8	20.7	36
Germain et al., 2009 [14]	41.7	50.0	37.5	25
Gros et al., 2018 [15]	26.3			
Kopel et al., 2001 [17]	40.0			
Kramer et al., 2021 [18]	32.4	40.0	25.0	20
Morland et al., 2015 [21]	22.2	20.6	23.8	24
Stewart et al., 2017 [24]	0.0	0.0	0.0	16
Wierwille et al., 2016 [27]	53.6	60.0	47.1	
Yuen et al., 2015 [28]	29.7	36.1	23.7	10

Notes: All values are rounded to 1 decimal place for consistency and blank cells indicate missing values. Chae et al. [10], Clarke et al. [11], D'Souza et al. [13], King et al. [16], Mitchell et al. [20], Myers et al. [22], Steiger et al. [23], Tutty et al. [25], and VanHuysse et al. [26] were omitted as the studies did not report any values.

Table 4. Demographic Information, Telehealth Intervention Methods, and General Findings of Included Studies

ID	TP Delivery	Demographic	General Results
Acierno et al., 2016 [5]	Videoconferencing	232 Veterans with PTSD / major depression (MD).	Both treatment modalities saw improvements in overall mental health functioning, particularly with PTSD. Outcomes of home-based telehealth (HBT) treatments for PTSD are slightly more effective but differences are insignificant.
Acierno et al., 2021 [6]	Videoconferencing	136 Women veterans with military sexual trauma (MST) related PTSD	No systematic differences between HBT & in-person (IP) treatment for PTSD & depression overall. Pre-post treatment differences for PTSD symptoms were large, and symptom severity decreased over time during treatment. Depressive symptoms for both IP and HBT delivery decreased over time during treatment.
Acierno et al., 2017 [7]	Videoconferencing	132 Veterans who met criteria for PTSD	Measures of PTSD and depressive symptom scores indicate that there are similar rates of improvement in IP and HBT treatment. There are also no significant treatment differences in outcomes at all follow-ups.
Ben-Zeev et al., 2018 [8]	Mobile App (mHealth)	163 adult clients with long-term mental illness: schizophrenia (SZ), bipolar disorder (BD), or MD.	The mHealth intervention had significantly more patient engagement compared to clinic-based treatment but had similar patient satisfaction and clinical outcomes otherwise.
Bistre et al., 2022 [9]	Videoconferencing	38 adult patients admitted to an ER.	Complete agreement on diagnoses between face-to-face (FTF) and telepsychiatric (TP) groups were weak, but partial agreement was strong. Overall, the results show similar reliability between both delivery modes for psychiatric assessments.
Chae et al., 2000 [10]	Telemedicine (via telephone network)	30 patients (20-50 years) with DSM-4 diagnosed.	Correlation coefficient for total score between the 2 raters were significantly higher for telemedicine compared to IP interviews.

ID	TP Delivery	Demographic	General Results
Clarke et al., 2016 [11]	Mobile App (mHealth)	89 volunteers with Type 1 (n=34) or Type 2 (n=55) diabetes with at least mild depressive symptoms.	Immediate postintervention outcomes saw a consistent improvement for depressive and anxiety symptoms, mental health self-efficacy, work and social functioning. Within-group effect sizes were between moderate to large.
Dennis et al., 2020 [12]	Telemedicine (via telephone network)	241 English-speaking, clinically depressed women between 2-24 weeks postpartum.	Women in the telemedicine group met significantly less depression criteria immediately postintervention than the control group. Significant group differences were sustained at 3 months postintervention. At 36 weeks, no significant differences were found. The intervention group is 4.5 times less likely to be depressed, and attachment avoidance decreased more.
D'Souza et al., 2000 [13]	Videoconferencing	7094 suicidal veterans receiving clinical video telehealth online or mental health services IP whose data are in medical records.	12 months after their first appointment, 2.1% the IP group received a SBR compared to the 1.9% from the intervention group, which is not statistically significant.
Germain et al., 2009 [14]	Videoconferencing	48 adults with PTSD eligible for CBT.	Most participants in both groups no longer met PTSD diagnostic criteria postintervention. No significant differences were observed between the two groups over time. The results between the 2 groups also do not reveal significant differences, but there was a significant overall effect.
Gros et al., 2018 [15]	Video Telehealth (prolonged exposure)	67 veterans (20-75 years) with PTSD recruited primarily through referrals.	Results demonstrated a significant effect of telehealth intervention on participant willingness to drive further for telehealth services with PE, compared to participants in the IP section. There were no other significant group differences in satisfaction and perception.
King et al., 2020 [16]	Videoconferencing	51 undergraduates from a large Midwestern university who signed up for the study for extra credit, and who indicated that they engaged in heavy episodic drinking within 2 weeks before recruitment.	After controlling for other variables, FTF and videoconferencing treatments did not differ at 1 month posttreatment. Changes from baseline to 1 month also did not differ from changes from 1 month to 3 months. Both groups experienced significantly reduced alcohol consumption, and both saw increased satisfaction overall between sessions.
Kopel et al., 2001 [17]	Videoconferencing	136 children and adolescence living in rural NSW.	95% of the young participants and/or their parents rated their service as excellent or good, 97% reported that they were mostly or very satisfied with the amount of help received, and 80% reported that it would be inconvenient or very inconvenient to attend FTF interviews, as opposed to video conferencing.
Kramer et al., 2021 [18]	Web-Based Intervention (online CBT modules)	136 Depressive patients recruited from waiting lists of outpatient clinics and had depressive symptoms above the	Depressive symptoms improved very significantly over 5 months. Those assigned to the eHealth group improved significantly more than the controls, and the mean

ID	TP Delivery	Demographic	General Results
		cut-off in the screening questionnaire.	difference of depressive symptoms between the groups correspond to a medium between-group effect. Significantly more participant in the eHealth group achieved symptom remissions. No significant differences were found between the groups' physical quality of life, attitudes, or motivation for psychotherapy.
Milosevic et al., 2022 [19]	Videoconferencing	413 Adult outpatients of an anxiety clinic who attended a CBT group: panic disorder or agoraphobia (PDA) / social anxiety disorder (SAD) / GAD / obsessive compulsive disorder (OCD) delivered either FTF or online. All participants had a primary diagnosis of a DSM-5 anxiety or related disorder, SAD, GAD, or OCD.	All groups showed significant improved functional impairment over the course of the treatment. Effect sizes for treatment were mostly comparable. For GAD, there was a small but significant positive effect in FTF treatment on reduction in symptoms, compared to videoconferencing and regardless of baseline severity. The same effect was not significant for SAD, PDA, and OCD.
Mitchell et al., 2008 [20]	Telemedicine (via telephone network)	128 participants meeting DSM-4 requirements for bulimia nervosa (BN) or eating disorder, whose body weight was not less than 85% of their ideal weight.	None of the differences in abstinence rates approached statistical significance. No differences were found between the groups in the frequency of binge eating episodes. Participants in the IP group report significantly lower levels for both binge eating and purging. Responses in the IP group occurred more rapidly compared to the online group. Purging frequency at the 12-month follow-up for the IP group was significantly lower.
Morland et al., 2015 [21]	Videoconferencing	126 Women civilians and veterans currently diagnosed with PTSD.	At posttreatment, participants reported high levels of satisfaction with services. Both treatment conditions saw improvements in PTSD symptoms. There was a statistically significant difference between IP and videoconferencing groups, in that IP women reported scores higher than the telemedicine group.
Myers et al., 2015 [22]	Videoconferencing	233 children (5.5-12 years) meeting diagnostic criteria for ADHD referred by healthcare providers.	Overall, caregivers and teachers rated improvements in ADHD-related symptoms across the 25-week follow-up period. Caregiver-rated outcomes indicate that children in the telehealth delivery group had significantly greater improvement on the Vanderbilt ADHD Rating Scale and Columbia Impairment Scale-Parent Version (CIS-P) on inattention, hyperactivity / impulsivity, combined ADHD, and ODD. Functional improvements were also significantly greater from baseline to follow-up in the telehealth delivery group.

ID	TP Delivery	Demographic	General Results
			Teacher-rated outcomes demonstrated significantly greater improvements at least once for hyperactivity and total ADHD in the telehealth group, but no difference in outcomes between inattention and ODD.
Steiger et al., 2022 [23]	Videoconferencing	125 Adults treated IP and online over the course of 10-14 weeks receiving comparable treatments. Participants were included if they were diagnosed with anorexia nervosa, BN, other feeding or eating disorders, or avoidant food intake disorder, and had a BMI below 30.	There was a significant increase in BMI and eating symptoms over time in both groups, with no difference associated with IP or virtual therapy. Participants in both groups reported comparable satisfaction, and those in the virtual group generally reported positive experiences with no evidence of adverse experiences related to concerns about confidentiality or online security.
Stewart et al., 2017 [24]	Videoconferencing	15 Trauma-exposed youth (7-15 years) referred for treatment at a trauma treatment center in Southeastern US. All children met criteria for PTSD or adjustment disorder per DSM-4 and displayed significant PTSD symptoms. All children and their families had to have at least one barrier to accessing treatment IP (rural location, work schedule, limited English proficiency, etc.).	The difference in pre and post-treatment scores from both self-report and parent scores indicate clinically and statistically significant PTSD symptoms, SCARED (anxiety-related), SMFQ (mood) scores. Caregivers of the children were satisfied with telehealth 100% of the time, and 86% indicated that it was easy to use.
Tutty et al., 2010 [25]	Telemedicine (via telephone network)	30 Adults initiating psychotherapy for depression at a mental health clinic .	69% of telehealth patients were “very satisfied” with treatment at the 6 month follow-up. On average, the participants’ depression severity decreased, and improvements were significant. The proportion of participants not meeting DSM-4 criteria for depressive disorder at 3 months posttreatment was 23.3%, and 50% at 6 months. 42% of the sample was considered as recovered. The findings suggest that CBT-TT is feasible for treating adult depression.
VanHuysse et al., 2023 [26]	Videoconferencing	102 Patients (9-23 years) primarily diagnosed with anorexia nervosa or atypical anorexia, below their expected body weight (EBW <95%) upon enrollment.	Both treatment groups improved on %EBW, and group differences are insignificant.
Wierwille et al., 2016 [27]	Videoconferencing	221 Veterans who met criteria for PTSD according to DSM-4-TR.	Scores for PTSD decreased significantly pre to posttreatment for both groups, and differences are not statistically significant. Scores for depressive symptoms have a similar pattern.
Yuen et al., 2015 [28]	Videoconferencing	54 Veterans (20-75 years) with combat-related PTSD meeting criteria for PTSD (from DSM-4-TR).	Overall, symptoms of PTSD, depression, and anxiety decreased in both groups. Satisfaction ratings were high for both conditions. Differences were not statistically significant.

ID	TP Delivery	Demographic	General Results
Zimmerman et al., 2022 [29]	Videoconferencing	64 Patients with borderline personality disorder (BPD).	Patients in the eHealth group had significantly lower scores on coping sub-scores on RDQ-M. There are no other significant differences. Under both treatment modalities, patients significantly improved from admission to discharge on each RDQ-M subscale, with large effect sizes. The eHealth program also reported significantly greater improvement in functioning. Most patients in the eHealth and IP groups indicated they were "very satisfied" or "extremely satisfied" with the initial evaluation.

Note: A more detailed version of this table is included in Appendix A.

Discussion

The treatment effects, patients' satisfaction with their service, and reliability of psychiatric interventions delivered online and offline were investigated. Studies that measured changes in symptoms and functioning in response to psychiatric interventions observed significant improvements, and satisfaction reports showed that most participants were very satisfied with their treatments. However, most of the studies found negligible differences between modalities in terms of treatment efficacies and satisfaction levels. Studies reporting on the reliability presented contradictory results, indicating some level of ambiguity in terms of test-retest reliability of telepsychiatry interviews and diagnoses.

The comparable results of psychiatric treatments conducted online and offline suggest that both modalities are similarly effective in alleviating the burden of mental disorders for individuals affected. It reveals that telepsychiatry is an effective means of extending treatment access and reach to individuals facing barriers to care at little to no impediment to treatment efficacy and quality. This includes individuals living in remote or underserved areas, those with mobility issues, limited transportation options, or have difficulty attending IP treatments due to other time commitments [4]. However, participants assigned to different modalities received different treatment programmes in some studies [8, 12, 18]. Treatment approaches and intervention periods were similar in these cases, which highlights the importance of developing treatment programs that could be integrated both online and offline interchangeably for future telemedicinal programs. Ensuring that programs are similar and can be seamlessly integrated into both modalities is important to maintain treatment fidelity, consistency, and comparability. Comparability of treatments between modalities allow for fair assessments of treatment outcomes and avoid confounding factors that may arise from divergent interventions.

Comparable levels of satisfaction reported between online and offline treatment modalities indicate that telepsychiatry can meet the established standards of mental health treatment as well as the satisfaction needs of its patients. The general insignificant differences in satisfaction between online and offline treatment indicate that patients perceive similar levels of overall support regardless of which treatment modality they undergo. Similar treatment outcomes and satisfaction levels has important implications for telepsychiatry as viable and acceptable alternatives to traditional IP clinic-based interventions, as individuals facing barriers to accessing IP treatment can still receive a therapeutic experience of similar quality through telepsychiatry.

The only studies that reported on the test-retest reliability of psychiatric interviews and diagnoses pose as a significant limitation to overall results on reliability due to their contradicting results. While the 2022 by Bistre et al. study found a degree of reliability and consistency between online and offline interventions, the study from 2000 by Chae et al. showed that telepsychiatric interviews exhibited higher consistency and agreement in capturing overall assessment [9, 10]. The contradictory results suggest that there may be multiple factors influencing test-retest reliability of telepsychiatry interventions in different studies. The 2000 study may have been conducted at an earlier stage of telemedicinal development when technological infrastructure and communication tools were less compatible with the in-person treatment modalities, resulting in different test-retest reliability scores. In contrast, the 2022 study may have incorporated more advanced technologies that contributed to the comparable reliability between IP and telepsychiatric interventions. Further research is needed to better understand the underlying reasons for these discrepancies and identify strategies to improve reliability in telepsychiatry.

As observed in Dennis et al., the phenomenon where the advantages of telehealth interventions appear to dissipate over time could be attributed to various factors [12]. Firstly, the initial positive effects observed in telehealth interventions may be due to the natural course of the disorder. More specifically, Dennis et al. examined women initially suffering from post-partum depression [12]. Due to the nature mood disorders, patients often

experience frequent fluctuations in mood and symptom severity as part of the natural course of such illnesses, including clinical depression. Other factors that may impact the clinical outcomes reported in the study were follow-up and aftercare, psychosocial factors experienced by each patient, as well as the quality of treatment provided. Although none of the other studies reported dissipating advantages of a specific treatment modality, this literature review recognizes that the sustainability of treatment effects could be influenced by a combination of factors, making it crucial for healthcare providers to consider both short and long-term strategies for patients with mental health conditions.

It should be noted that the literature review incorporated several mental health diagnoses that are usually treated in person. The diagnoses — ranging from depression and anxiety to alcohol use disorder — have unique characteristics, symptoms, and treatment approaches. For instance, depression is characterized by persistent feelings of sadness or the inability to experience pleasure [30], while anxiety disorders encompass excessive fearfulness, anxiousness, or avoidance of perceived threats that are marked and persistent [31]. Each diagnosis presents its own set of patterns and unique challenges for the patient, such as symptom management, patient engagement rates, and relapse prevention strategies. While common comorbidity between psychiatric disorders amplifies such challenges in treatment and care management, the literature review's inclusion of a diverse range of disorders acknowledges the common comorbidity and ensures the study's findings are not confined to isolated diagnoses in order to reflect the intricate web of mental health conditions that individuals often face. By including a broad range of diagnoses, the literature review also captures a wider breadth of conditions that are not often addressed through telemedicinal approaches, providing insight to its effectiveness in comparison to an in-person treatment approach. However, the study's goal to investigate real-world telemedicinal outcomes through its diversity in mental health diagnoses necessitates a nuanced approach to assessing the outcomes of telepsychiatric interventions. For example, while some conditions might be well-suited for remote care, others may require more intensive in-person interventions — as seen in the studies that included exposure therapy via virtual reality for PTSD. The wide range of treatment methods to different psychiatric disorders also raises questions about the generalizability of findings and varying levels of treatment adherence. To combat this issue, the interpretation of each of the 25 studies consider the intricacies of each diagnosis and its specific treatment landscape so that patterns and differences specific to each diagnosis could be easily identified. The inclusion of a diverse array of psychiatric conditions also necessitates the use of unique assessments tailored to the specific symptoms and characteristics of the disorders. This specificity negatively impacts the generalizability of treatment outcomes across different psychiatric conditions when making comparisons between treatment modalities, which meant that any comparison of outcomes between telepsychiatric and in-person care was limited to the specific disorder. Additionally, while some measures are patient-reported, others rely on clinical outcomes. The use of self-reports in assessing outcomes — such as quality of life or patient satisfaction — offer valuable insights into patient preferences as well as how telepsychiatric interventions impact daily lives and functioning. On the other hand, clinical assessments by certified practitioners give an objective evaluation of symptom severity, with limited insights from the patients' point of view. The varying perspectives gained from patient-reported measures and clinical assessments complement each other, providing more comprehensive views of treatment effectiveness in telepsychiatric settings from both patient and practitioner. The diverse range of outcome measures was necessary due to the wide range of psychiatric diagnoses included, but at the cost of challenging the direct comparability of outcomes across different conditions. Acknowledging the nuances of outcome comparisons across modalities is necessary for a clear interpretation of findings and to understand the implications of telepsychiatric care for diverse populations.

In addition, the average treatment duration of the studies ranges from 10 in Yuen et al. to 48 in Acierno et al. (2016) [5, 28]. While most of the studies had a duration of 24 weeks and moderate dropout rates that range from 10% to 22.2%, the 48-week study had a relatively lower overall dropout rate of 13.3%. With its extended treatment duration and relatively lower dropout rate, the study may offer more reliable insights into the sustainability and acceptability of telepsychiatry interventions over extended periods of time, and may provide a benchmark for future investigations into the durability of treatment outcomes. On the other hand, the average study duration of 10 weeks in Yuen et al. had an overall dropout of 29.7%, which is above the median among the studies that reported dropout rates [28]. The relatively higher dropout rate observed in the study and its shorter average duration raises questions about the retention and engagement of participants over a concise treatment period. The contradicting patient retention and duration outcomes observed between Acierno et al. (2016) and Yuen et al., and the varying durations of each of the 25 studies suggest that the effectiveness of psychiatric interventions in general may be influenced by factors like treatment duration and participant commitment over time, which negatively affects the generalizability of treatment outcomes observed in this literature review. This scenario warrants future investigation into optimal treatment lengths on telepsychiatry to ensure sustained engagement.

This review provides a comprehensive overview of the disparities in treatment outcomes, efficacy, and reliability of IP versus online mental health care. However, it is crucial to acknowledge certain limitations associated with the review's methodology. Firstly, only 25 papers available

in English and limited to a few databases were considered, which limited the scope of the summary and may not adequately represent the entire body of research on telemedicine. Consequently, the findings may not capture the full range of variations in telepsychiatric interventions and diverse patient populations. Furthermore, 16 out of the 25 studies used patient self-assessments to measure outcomes and satisfaction. While self-assessments provide valuable insights to the patients' experience, they may introduce some level of bias and subjectivity in a study's results as individuals may have different levels of self-awareness in their mental health. Having patients recall their experiences from before they had received treatment may introduce the possibility of inaccuracies as human memory is inherently fallible. Lastly, the considerable range in total dropout rates reported by some studies indicates the potential challenges associated with retaining participants, limiting the ability to draw definite conclusions about the studies included. These factors contribute to limitations that should be considered when evaluating the robustness & generalizability of the findings.

Conclusions

This review demonstrated that psychiatric treatments online are effective in improving symptom severity just as well as its IP counterpart. These findings underscore the potential of telepsychiatry to address disparities in mental healthcare access and alleviate the burden of mental illness for individuals whose condition would otherwise go untreated. However, it is important to continue exploring factors that influence the quality of therapeutic relationships, communication, and the ease of technological use for online treatment modalities. Further research should be done to explore the practices and guidelines for optimizing the reliability of telepsychiatric interviews and diagnoses. Efforts should also be made to standardize assessment protocols and enhance technological capabilities will contribute to the overall validity and reliability of telepsychiatric assessments, enhancing the confidence of treatment decisions in this mode of care. While it is not cure-all for the global burden of mental illnesses, telepsychiatry can serve to enhance patient engagement, improve treatment adherence, and contribute to overall positive treatment experiences by offering a convenient platform to receive mental health services for those with access to technology.

List of Abbreviations Used

ADHD: attention deficit hyperactivity disorder
AUDIT: alcohol use disorder identification test
BAI: Beck anxiety inventory
BD: bipolar disorder
BDI: Beck depression index
BMI: body mass index
BN: bulimia nervosa
BPD: borderline personality disorder
BPRS: brief psychiatric rating scale
CAPS: clinically administered PTSD scale
CBCL: child behaviour checklist
CIS: Columbia impairment scale
DAST-10: drug abuse screening test
DSM: diagnostic and statistical manual of mental disorders
EBW: expected body weight
EDE-Q: eating disorder examination questionnaire
FTF: face-to-face
GAD: generalized anxiety disorder
HBT: home-based telehealth
HMD-D: Hamilton rating scale for depression
IP: in-person
MD / MDD: major depression / major depressive disorder
MH: mental health
MST: military sexual trauma related PTSD
OCD: obsessive-compulsive disorder
ODD: oppositional defiant disorder
PCL: post-traumatic stress disorder checklist
PDA: panic disorder and / or agoraphobia
PE: prolonged exposure
PTSD: post-traumatic stress disorder
RDQ-M: remission from depression questionnaire
RSE: Rosenberg self-esteem assessment
SAD: social anxiety disorder
SBR: suicide behavioural report
SCARED: screen for children's anxiety-related emotional disorders
SCID: structured clinical interview for DSM-5
SCL-90: symptom checklist-90-R
SF-36: medical outcomes study 36-item short-form survey
SMFQ: short mood and feelings questionnaire
SZ: schizophrenia
TP: telepsychiatry
TSQ: telehealth satisfaction questionnaire
VADRS: Vanderbilt ADHD rating scale
WRAP: wellness recovery action plan
WSAS: work and social adjustment scale

Conflicts of Interest

The author declares that they have no conflict of interests.

Ethics Approval and/or Participant Consent

This review does not involve interaction with participants or collection of primary data. It relies on analysis & synthesis of existing studies using public information rather than interventions or personal data from individuals. Contributors' rights are upheld by ensuring that information in this review is properly attributed to their authors.

Authors' Contributions

JF: Contributed to the focus, design, and purpose of the study, as well as the processes of data collection, synthesis, interpretation, analysis, drafting, and revision of the manuscript.

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