

Treatment Outcome Comparison between Telepsychiatry and Face-to-face Buprenorphine Medication-Assisted Treatment (MAT) for Opioid Use Disorder: A 2-Year Retrospective Data Analysis

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Objectives: To retrospectively review clinic records to assess the difference between face-to-face and telepsychiatry buprenorphine Medication-assisted treatment (MAT) programs for the treatment of opioid use disorder on three outcomes: additional substance use, average time to achieve 30 and 90 consecutive days of abstinence, and treatment retention rates at 90 and 365 days.

Methods: Medical records of patients (N=100) who were participating in telepsychiatry and in face-to-face group-based outpatient buprenorphine MAT programs were reviewed and assessed using descriptive statistical analysis.

Results: In comparison with the telepsychiatry MAT group, the face-to-face MAT group showed no significant difference in terms of additional substance use, time to 30 days ($p=0.09$) and 90 days of abstinence ($p=0.22$), or retention rates at 90 and 365 days ($p = 0.99$).

Conclusions: We did not find any significant statistical difference between telepsychiatry buprenorphine MAT intervention through videoconference and face-to-face MAT treatment in our Comprehensive Opioid Addiction Treatment (COAT) model for individuals diagnosed with Opioid Use Disorder in terms of additional substance use, average time to 30 and 90 days of abstinence, and treatment retention rates.

Key Words: buprenorphine, MAT, opioid use disorder, telepsychiatry, retention.

INTRODUCTION

Over the past decades, opioid use disorder has become an epidemic health problem both in the United States and globally. Congruent with the peaking prevalence of this epidemic, the demand for Medication-assisted treatment (MAT) for opioid use disorder has risen sharply. In a span of 15 years from 1997 to 2011, opioid dependent Americans seeking MAT had increased by 900% (SAMHSA, 2010; 2013). Despite national data projecting a prevalence of opioid use disorder in sums surpassing 5 million in the United States, only a fraction of this population (22%) had received MAT from the years 2009 to 2013 (Rinaldo and Rinaldo, 2013; Alexander et al., 2015). While attributable etiologies behind poor treatment engagement are multifactorial, the reality of patient access limitations must be strongly considered, as 96% of all states in the US face a despairing gap between their opioid dependent population and their MAT capacity (Jones et al, 2015). The current waitlist for MAT at West Virginia University Chestnut Ridge Center (CRC) is more than 600 patients. While healthcare, legislative, and collaborative community efforts have produced progress in combating the opioid epidemic, the current state requires novel solutions to improve access for patients seeking treatment.

Opioid use disorder is a complex chronic health condition that often requires long-term structured treatment and care. The success of treatment often relies on combination of specific pharmacological and psychosocial interventions that aim to reduce both illicit opioid use and its related harms, and to improve quality of life (World Health Organization, 2009). Currently, methadone and buprenorphine are the only two opioid agonist medications approved by the Food and Drug Administration (FDA) for MAT of opioid use disorder.

Methadone is a full opioid agonist and has been used for opioid medication maintenance for many years (Dole and Nyswander, 1965; Mattick et al., 2009). Buprenorphine is a partial μ opioid agonist that was approved in 2002 by the FDA as a pharmacotherapy agent for the treatment of opioid use disorder in the United States (Fiellin et al., 2001; Food and Drug Administration, 2002). Buprenorphine is considered to be safer than methadone and equally effective for maintenance treatment (Pinto et al., 2008; Amass et al., 2012; Salisbury et al., 2012; Hser et al., 2014). Treatment using buprenorphine was reported to have good retention rates, treatment adherence, and patient as well as provider satisfaction (Becker and Fiellin, 2006; Pinto et al., 2008; Strobbe et al., 2011). Unlike methadone clinics, which are typically housed in stand-alone facilities, buprenorphine treatment programs are office-based. This allows patients to have easier access to MAT. However, many individuals, especially those who live in rural areas, seek this treatment but have limited to no access to buprenorphine providers.

Telepsychiatry may present a promising way to deliver MAT to this population and expand access to care. Using new audio-video technology to remove the barriers of time and distance for individuals who are most in need of medical and health care services is not a new idea, yet it has become increasingly popular in recent years (Wilson and Maeder, 2015). In the realm of psychiatry, diagnoses and treatment decisions are frequently based on record review, patient interview, and observation, enabling telepsychiatry to quickly evolve as an alternative to office visits for patients who do not have easy access to mental health services (Deslich et al., 2013; Ulzen et al., 2013). This could be a particularly attractive option for rural patients for whom face-to-face treatment access is limited. A recent published review of 70 studies found a wide consensus of equivalence, and in some cases superiority, in terms of diagnosis, clinical outcomes, access to care, and patient satisfaction of telepsychiatry medicine when compared to in-person services (Hilty, 2013). However, data regarding the utility of telepsychiatry for MAT for opioid

use disorder is very limited. To our knowledge, there have been no studies published regarding outcomes of telepsychiatry using buprenorphine in MAT.

This article reports data from a 2-year retrospective analysis comparing treatment outcomes between telepsychiatry and face-to-face MAT for opioid use disorder with buprenorphine. We introduce our outpatient Comprehensive Opioid Addiction Treatment (COAT) model for opioid maintenance treatment and assess the difference between telepsychiatry MAT and face-to-face treatment in this setting. The purpose of this pilot study is to establish a groundwork of evidence surrounding telepsychiatry and its role as an alternative means of delivering substance use disorder treatment to those outpatients who live in rural areas with limited access to addiction treatment and services.

METHODS

Study Setting

This study was conducted at West Virginia University Department of Behavioral Medicine and Psychiatry CRC, one of the largest mental health service centers in West Virginia. The center provides opioid use disorder treatment through both face-to-face and telepsychiatry clinics by using an interdisciplinary team approach named the Comprehensive Opioid Addiction Treatment (COAT) program. It includes group-based medication management followed by substance use disorder focused group therapy at the same clinic visit. The group therapy content is not standardized, however all therapists use a CBT based therapeutic model incorporating psychoeducation regarding the disease of addiction, relapse prevention, and 12-step facilitation concepts. There were no efforts to ensure the equivalence of group therapy at the two sites. Initially, patients attend these treatment services weekly. Once they have 90 days of abstinence and are actively involved in 12-step meetings as evidenced by having a 12-step sponsor, they begin to come every other week. After a year of abstinence from alcohol and any illicit drugs, they may attend treatment monthly.

Each patient signs an agreement before being enrolled in the COAT clinic. A list of medications including selected controlled substances is disallowed for the purpose of buprenorphine maintenance treatment. All patients are required to attend a minimum of four 12-step meetings a week and submit to random urine drug screens. All urine drug tests are first done on site using enzyme immunoassay (EIA) screening that allows for rapid results reporting. The provider gets the screening report immediately during the group time, and discusses the results with patients. Secondary analysis on the same specimen is performed with gas chromatography/mass spectrometry (GC/MS) testing methodology. This serves as confirmatory and provides identification and quantification of the specific drugs present. The final results (if positive) are used to compare with patients' self-reports, and discussed in the following week's medication and therapy group session. To ensure treatment adherence, buprenorphine and its metabolite nor-buprenorphine must be present in the urine drug screen in order for a new prescription to be written. If a patient has a positive urine drug screen, they may be required to attend more 12-step meetings, to increase individual therapy sessions, or to come back for more frequent pill counts or urine drug screens. Sometimes, a patient in a bi-weekly group may be sent back to the weekly group if frequent relapses occur. Patients can only be moved to a bi-weekly group after attaining 90 consecutive days of abstinence, completing the required number of 12-step meetings and obtaining a 12-step sponsor. Criteria for patient discharge include evidence of dishonesty, diversion, illegal activity on the premises or if a patient requires a higher level of care. These circumstances are all clearly specified in the COAT treatment agreement signed before patient enrolls in the program. Patients who discontinue

the clinic for any reason can re-enroll after one month. The telepsychiatry program for MAT follows the same model, except that the psychiatrist delivers addiction assessment and care in a group setting through videoconferencing to patients who live in two rural southern West Virginia counties located 225 miles from CRC. Those patients receive their group therapy and random urine drug screenings through local community mental health facilities.

Design

The study design is a retrospective chart review. Treatment information regularly recorded for all COAT patients includes current and previous buprenorphine formulation and dosage, abstinence time, random Urine Drug Screen results, peer support group meeting attendance, 12-step sponsorship status, etc. The two telepsychiatry sites in remote counties included in this study keep records of initial psychosocial intakes and therapy notes that include substance use and treatment history, psychosocial history, and therapy progress related information. We reviewed the notes from 01/01/2013 to 12/31/2014 and selected COAT clinic patients who were under the care of the same psychiatrist who provided medication management through both telepsychiatry and face-to-face method during the same study period. Those who enrolled after 10/01/2014 were excluded because they had not been in the treatment program for 90 days by the end of the study window time (12/31/2014) and therefore could not be used for 90 days abstinence or retention calculation. Patients included in the study received MAT services in weekly and biweekly groups at CRC or telepsychiatry sites. Group therapy at all locations had the same structure and goals. The treatment requirements including meeting and therapy attendance followed the same agreement and policy. The group therapists were different for telepsychiatry and face-to-face treatment. Group therapy was face-to-face for both treatment groups. As this was a retrospective chart review of existing clinical data, the West Virginia University Institutional Review Board approved this study and granted a waiver regarding the need to obtain informed consent and Health Insurance Portability and Accountability Act authorization.

At the beginning of this study period the DSM IV was still in use and some patients in the study were diagnosed with opioid dependence. Since that time, the DSM 5 has been approved. All patients were assessed to meet criteria for opioid use disorder and that diagnosis is the one referenced in this paper.

Measures

Abstinence time was defined as days since last use of non-prescribed or illicit opioids or any prohibited drugs or alcohol. Drug use was based on both patient self-report and/or random urine drug screen test results. Though not specifically examined, it appears to the clinicians that patients reported more relapses than detected by urine drug screen tests.

Times to 30 and 90 days abstinence were defined as from the time each patient started the treatment program to the time each patient reached 30 and 90 consecutive days of abstinence time respectively.

Treatment retention was calculated at 90 and 365 days after the enrollment. The admission to treatment programs was on a rolling basis, which means that patients could be admitted anytime during the year. For this study, we reviewed the notes over two years. The retention rate was calculated as the percentage of patients who stayed in treatment over 90 or 365 days. With the study period ending on 12/31/2014, we excluded patients starting the program after 10/01/2014 for 90-day retention calculation and those starting after 01/01/2014 for the 365-day retention calculation. Some patients

were discharged but then reenrolled during the study period; these were counted as separate cases for this study purpose.

Statistical Analysis

The primary endpoints are the treatment outcomes measured in three parameters: rates of additional substance use, average time to get to first 30 and 90 consecutive days of abstinence, and retention rates at 90 and 365 days. For the continuous outcome of time to 90 consecutive days of abstinence with standard deviation of 35 days, our sample size in this study has 80% power to detect a difference of 20 days between two treatment groups using two-sided two-sample t-test. For the binary outcome of retention (yes or no), the same sample size has 80% power to detect a difference of 50% versus 78% retention rates between two treatment groups. Descriptive statistics were used to analyze the parameters being investigated, including mean with standard deviation and range for continuous variables such as time in days to 30 and 90 days of abstinence, and proportions or percentage for categorical variables. Wilcoxon rank sum test was used to assess telepsychiatry and face-to-face groups without normal distribution assumption. Chi-squared test was applied to assess the observed difference in additional substance use and retention rates between the two groups. A logistic regression model by the generalized estimating equations (GEE) was used to adjust for covariates for determining the association between treatment modality and retention, measured as a binary outcome (yes/no). A p-value < 0.05 implies the statistical significance in this study. Statistical calculations were performed using SAS 9.2 and R software, version R 3.1.3.

Participants

A total of 100 patients were included in this study. Basic demographic and opioid use characteristics are presented in Table 1. There were several instances of missing data due to incomplete records.

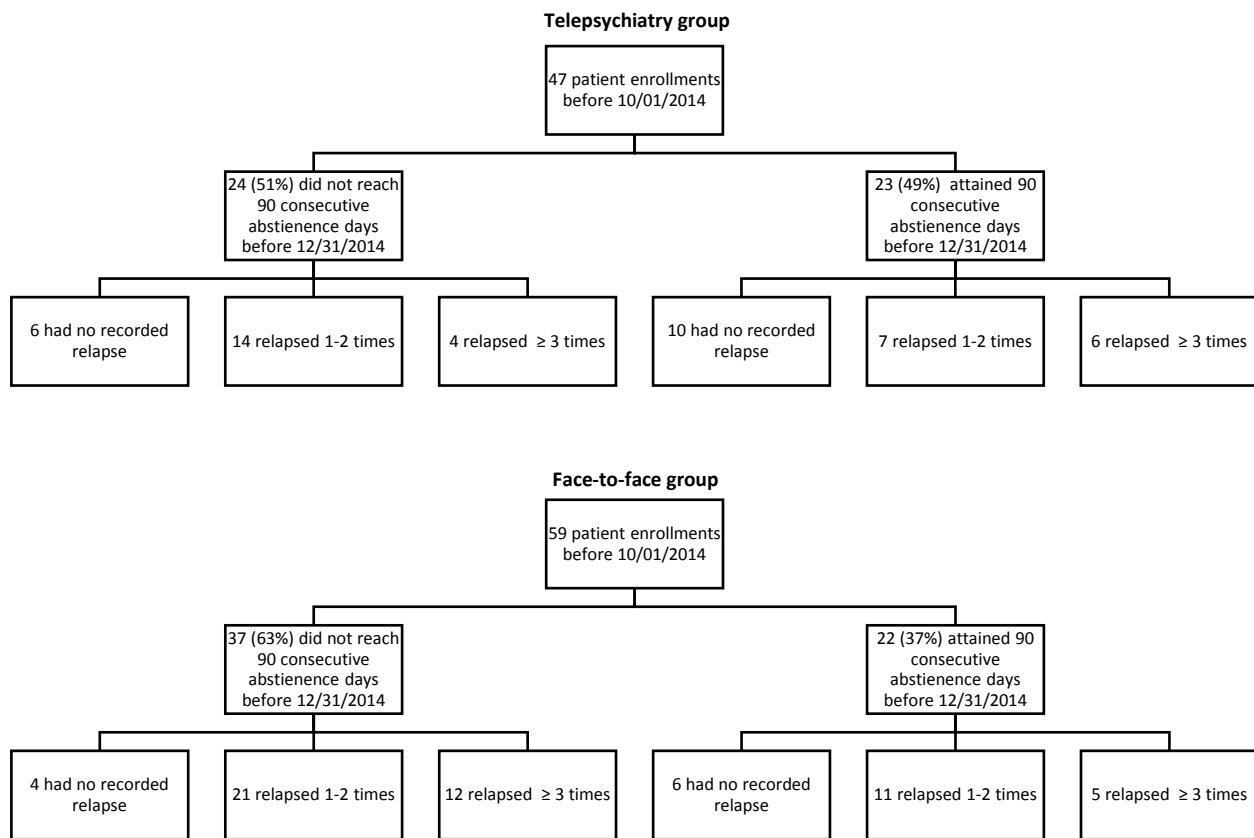
Table 1. Participant Characteristics			
	Telepsychiatry (n = 46)	Face-to-face (n = 54)	p value
Age	37.2 ±7.6	34.4± 9.9	0.11
Gender			0.89
Male (%)	22 (47%)	24 (44%)	
Female (%)	24 (53%)	30 (56%)	
Race			0.57
African-American (%)	1 (2%)	2 (3.7%)	
Caucasian (%)	45 (98%)	49 (90.7%)	
Other (%)	0 (0%)	1 (1.9%)	
Unknown (%)	0 (0%)	2 (3.7%)	
Education			0.99
Less than high school (%)	15 (33%)	17 (32%)	
High school or above(%)	31 (48%)	32 (13%)	
Unknown (%)	0 (0%)	5 (9%)	
Employment			0.99
Not Employed	43 (93%)	39 (72%)	
Employed	3 (7%)	10 (19%)	
Unknown (%)	0 (0%)	5 (9%)	
Other comorbid psychiatric diagnosis			0.9

No	13 (28%)	17 (31%)	
Yes	33 (72%)	37 (69%)	
Length of opioid use (months)			0.85
> 36	43 (94%)	50 (93%)	
≤ 36	2 (4%)	4 (7%)	
Unknown (%)	1 (2%)	0 (0%)	

RESULTS

The demographics of two study populations are illustrated in Table 1. No statistical difference was detected between the telepsychiatry and face-to-face groups, exemplified by p values >.05 in each demographic metric examined.

Figure 1. Summary of Additional Substance Use



Additional substance use is summarized in Figure 1. The telepsychiatry group percentage of those attaining 90 consecutive days of abstinence before 12/31/2014 is 49%, and 37% in the face-to-face group; Chi-squared test ($p = 0.31$) indicating no significant difference between the two groups. More than half of each group (51% of the telepsychiatry and 63% of the face-to-face group) was unable to attain 90 days of abstinence before 12/31/2014. Among those reaching 90 days of abstinence time, 10 (43%) telepsychiatry patients and 6 (27%) face-to-face patients did not use any additional substances while attending the weekly groups. 6 (13%) patients from the telepsychiatry group and 4 (7%) patients from the face-to-face group dropped out of program (mostly had no shows to groups) at an early

treatment phase (some less than 1 week), before a possible relapse could be recorded. Additionally, comparison of the percentage of patients with 0, 1-2, or ≥ 3 relapses between the two groups fails to show differences that were statistically significant ($p = 0.12$). There is also no statistical difference ($p = 0.38$) when comparing only those patients who attained 90 consecutive days of abstinence. In both the telepsychiatry and face-to-face groups, the most common number of relapses was 1-2. Among telepsychiatry patients who eventually attained 90 consecutive days abstinence within the study window, it was almost equally as common for patients to relapse 1-2 and ≥ 3 times. Comparatively overall, there were less face-to-face patients who had ≥ 3 relapses, but had more than two times the amount of patients relapsing 1-2 times in contrast to the telepsychiatry 90-day abstinence subgroup. Of note, there were several instances of repeat enrollment. In the telepsychiatry group, one patient had two separate enrollments in the weekly group and counted twice (total 47 instead of 46), this patient did not advance past weekly group in two enrollments. In the face-to-face group, five patients had two separate enrollments in the weekly group therefore counted twice (total 59 instead of 54). Among these five, only two advanced to the biweekly group on second attempt.

Table 2. Comparison of Time to 30-day and 90-day Abstinence between Telepsychiatry Group and Face-to-face Group

	Telepsychiatry	Face-to-face	P
	Mean/Median (Range)	Mean/Median (Range)	
Time to 30 days	35/30 (30, 70)	42/30 (30, 112)	0.09
Time to 90 days	106/90 (90, 194)	112/94 (90, 236)	0.22

Table 2 illustrates the comparison of time to reach 30 and 90 days of abstinence between the two groups. In the telepsychiatry group, it took patients a range of 30-70 days to reach 30 consecutive days of abstinence, whereas it took the patients in the face-to-face group 30-112 days. In terms of time to reach 90 days of abstinence, telepsychiatry patients required 90-194 days, while face-to-face patients required 90-236 days. Neither of these differences were statistically significant, although at the .09 p value, the telepsychiatry group trended towards achieving clean time more quickly. While the face-to-face group has a longer average time to 30 and 90 days of abstinence, the p value indicates that these differences are statistically insignificant.

Table 3. Comparison of 90-day Retention Rates between Telepsychiatry Group and Face-to-face Group for Patients Enrolled Before 10/01/2014

Group	Stayed less than 90 days	Stayed more than 90 days	Total	p
Telepsychiatry	23(48.9%)	24(51.1%)	47	0.99
Face-to-face	30(50.8%)	29(49.2%)	59	

Table 4. Comparison of 90-day and 365-day Retention Rates between Telepsychiatry Group and Face-to-face Group for Patients Enrolled Before 01/01/2014

All patients					
Group	Stay less than 90 days	Stay between 90-	Stay more than 365 days	Total	p

365 days					
Telepsychiatry	12 (50%)	2 (8.3%)	10 (41.7%)	24	0.99
Face-to-face	14 (45.1%)	6 (19.4%)	11 (35.5%)	31	
Patients who stayed in program > 90 days					
Telepsychiatry		2 (16.7%)	10 (83.3%)	12	0.49
Face-to-face		6 (35.3%)	11 (64.7%)	17	

Group retention rates are presented in Tables 3 and 4. Table 3 illustrates the group comparison for 90-day retention. It includes all patients enrolled before 10/01/2014, as patients enrolled after this date could not feasibly meet statistical inclusion for 90-day treatment retention by the end of the study window 12/31/2014. For this same reason, the 365-day retention comparison in Table 4 includes only patients enrolled before 01/01/2014. We also calculated 90-day retention for this subgroup.

For patients who could have potentially stayed in treatment for 90 days, both groups retained close to 50% of patients at 90 days. Between patients that started treatment before 01/01/2014, the retention rates at 90 days are comparable to the previous groups, 12/24 (50% telepsychiatry group) and 17/31 (54.9% face-to-face group), both consistently close to 50%. The retention rates at 365 days decreased to 10/24 (41.7% telepsychiatry group) and 11/31 (35.5% face-to-face group). This difference was not statistically significant between the two groups ($p = 0.99$). In the multivariate analysis of these retention rates, the fitted GEE logistic model indicates no statistically significant difference between the two groups ($p = 0.29$ for 90 days and $p = 0.55$ for 365 days), adjusting for all variables from Table 1 except for race since there is only one African-American in the telepsychiatry group. Furthermore, when examining only the patients staying more than 90 days, the proportionated retention rates increase to 83.3% (10/12) in the telepsychiatry group and 64.7% (11/17) in the face-to-face group. Chi-squared test ($p = 0.49$) shows no statistical difference.

DISCUSSION

The results of this study show that there is no significant difference in terms of three different outcomes when comparing telepsychiatry and face-to-face modalities in MAT of opioid use disorder. In particular, retrospective analysis of patients enrolled in our COAT clinic failed to exemplify statistically significant differences in terms of demographics, additional substance usage, time to reach 30 and 90 consecutive days of abstinence, and patient retention rates at 90 and 365 days of treatment. From our data, it appears that in both groups, once a patient makes it past the early phase of treatment that they are much more likely to remain in treatment. Additionally, a possible trend was observed towards the telepsychiatry patients having slightly better outcomes in terms of time to reach 30 and 90 consecutive days of abstinence. With a larger sample size, we would be better able to assess if this translated into a significant difference.

Addressing the opioid epidemic and optimizing treatment for opioid use disorder remains a complex and multifaceted undertaking of great significance for patients, public health policy, and healthcare as a whole. With its high prevalence, chronic-relapsing nature, and broad implications (infectious disease, overdose mortality, and crime rates), a measurable strain is placed on local communities and healthcare

systems, making opioid use disorder an essential target for continued research, and for the development of new and modification of existing evidence-based treatments. Consequentially, practitioner adaptation has resulted in substantial variability between clinical practices of MAT for opioid use disorder. This creates a challenge in terms of data congruency and outcome measure (such as treatment retention rates and efficacy) compatibility across various clinical and research settings. Unfortunately, this study fails to address this challenge and lacks ability to draw inferences regarding efficacy, as a consequence of the nature of our retrospective study design.

In a recent meta-analysis of retention rates in MAT for opioid use disorder consisting of 55 published (RCT and non-RCT) trials from years 2010-2015, the authors report a staggering overall variability in retention rates of 19-94% at 3 months (Timko et al., 2016). The authors' extensive stratification of this study data by research design, treatment modality, and therapy modifiers clearly illustrates the broad spectrum of MAT in its current clinical form. Acknowledging a lack of study follow-up time for retention studies, the authors report an aggregate 6-month retention of 55% from non-RCT studies with buprenorphine/naloxone MAT with a psychosocial program and group cognitive behavioral therapy. Interestingly, with comparable practices of MAT to that of our study population, the retention statistics between our study and that of the stratified meta-analysis cohort share close resemblance.

The primary strength behind our study is that it presents pilot data on a patient population that has yet to be studied in terms of interventional delivery and associated outcomes through telepsychiatry when compared to its standard-of-care counterpart. In attempts to control for confounding, the study uses a standard delivery of MAT treatment by the same physician using the same MAT COAT model. While contributing noteworthy strength and validity to our study, it significantly restricts the sample size and statistical power, which is its primary weakness. Our power analyses indicate that the sample size in this retrospective study may be too small to detect small differences between these two treatment groups and that a larger prospective study should be used to confirm the result. We attempted to increase the length of the study period, but were ultimately restricted to two years due to limitations in medical record access. However, when compared to the majority of published literature on MAT retention, our two-year analysis period adds to our study's strength. Alternatively, multiple time-to-recurrence analysis may be a better choice to study this population if the data had been available. Additionally, different therapists delivered the group services between study groups, so there was likely some variation in the delivery of group therapy. Furthermore, we must take into account the unique characteristics of the population studied. West Virginia faces the highest opioid-related mortality rates nationwide. This population represents a rural population, which differs from that of the general treatment population, with telepsychiatry patients being from even less populated counties. Consequentially, it is important to recognize and acknowledge the possibility of unaccounted confounding in the study's findings as well as its generalizability to other populations and healthcare systems. Finally, another limitation of this study is the simplified measures of outcome. It should be noted that "Recover is not simply sobriety" (Schwarzlose et al., 2007). Additional components, such as employment, relationship and marriage, crime activity etc., are also particularly important to the recovering individual and to families and society. Unfortunately we did not collect data about these changes for the participants.

Nonetheless, in response to the lack of research in telepsychiatry outcomes in MAT, it is hoped that this pilot study will expand on the current state of research surrounding telepsychiatry as well as to underline the utility of telepsychiatry in the MAT setting for opioid use disorder. While sample size and statistical power are limited in this study, the novel application and pilot data serve as its primary

strength in exemplifying similarity in some objective outcome metrics. The hope is that this study will open further avenues for research, funding, and practical application in increasing access of psychiatric services through telemedicine, specifically in terms of substance use treatment and to populations with limited access to healthcare.

CONCLUSION

Increasing healthcare access and addressing healthcare disparities remains a top priority in this evolving age of medical practice, policy, and reform. Without question, the opioid epidemic demands priority and attention in terms of expanding research, practical solutions, increasing access, and improving treatment quality. Providing buprenorphine MAT for opioid use disorder patients can be done through either videoconference or face-to-face groups. Retrospective analysis of our Comprehensive Opioid Addiction Treatment (COAT) model yielded no statistically significant differences in outcome measures between intervention modalities of telepsychiatry and face-to-face in terms of additional substance use, average time to reach 30 and 90 consecutive days of abstinence, and patient retention rates at 90 and 365 days into treatment.

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