Patient Compliance of Patient Reported Outcome Measures in Measurement-Based Care After an Abrupt Shift to Telehealth During COVID-19

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Abstract

Measurement Based Care (MBC) is considered to be an evidence-based practice. Despite its well-documented efficacy, it is underutilized in the clinical community for various reasons, including clinician and patient buy-in. A key component to the successful implementation of MBC is the routine administration of Patient Reported Outcome Measures (PROMs). There is a lack of research describing the utilization of MBC in a telehealth setting. As technological innovations continue, a greater number of clinics are offering telemental health services. Additionally, the COVID-19 pandemic caused a majority of underprepared clinics to begin implementing telehealth. The present study sought to evaluate patient compliance with PROMs in MBC after an abrupt shift to telehealth due to the COVID-19 pandemic. Participants were collected from a clinical population at a community based psychological training clinic. The participants were separated into groups: modality 1 (in-person services, $n = 17$), modality 2 (telehealth services, $n = 17$), and modality 3 (hybrid of modalities 1 and 2, $n = 10$), to assess the effect of modality on mean PROM compliance. The participants were separated into groups adult ($\geq$18 years of age, $n = 23$) and child (<18 years of age, $n = 17$), to assess the effect of maturity on mean PROM compliance. Results showed that mean PROM compliance was significantly higher in the in-person modality than the telehealth modality. Results also showed that PROM compliance was significantly higher in adults than in children. There was not a significant interaction effect of modality and maturity on PROM compliance. Additionally, results showed that PROM compliance decreased significantly after the switch from in-person services to telehealth services in the hybrid modality. These findings show that clinics may face significant barriers to the implementation of MBC after a sudden shift to telehealth caused by an unforeseen stressful event.

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General Audience Abstract

Measurement-Based Care (MBC) is an effective practice for the treatment of patients in psychological practices. It is a collaborative process that involves the clinician and patient tracking treatment progress and outcomes through the use of consistently administered measures known as Patient Reported Outcome Measures (PROMs). Although MBC has been shown to be effective, there is little literature regarding its use in a telehealth setting. As a greater number of clinics begin offering telehealth services, questions regarding patient adherence to interventions have arisen. Furthermore, the global COVID-19 pandemic forced a majority of underprepared clinics to offer telehealth services. The current study sought to better understand potential barriers to the implementation of MBC in a telehealth setting. Participants were collected from patients receiving therapy at a community based psychological training clinic. The participants were separated into the groups: in-person services (n = 17), telehealth services (n = 17), and hybrid of in-person and telehealth (n = 10), to assess the effect of modality on mean PROM compliance. The participants were separated into groups adult (≥18 years of age, n = 23) and child (<18 years of age, n = 17), to assess the effect of maturity on mean PROM compliance. Results showed that patients in the in-person therapy group were more likely to complete their measures than patients in the telehealth therapy group, regardless of their maturity. Additionally, adult patients were more likely to complete their measures than child patients, regardless of the modality. Results also showed that patients who experienced both in-person and telehealth services were more likely to complete their measures before the switch to telehealth. These findings show that clinics may face significant barriers to the implementation of MBC after a sudden shift to telehealth caused by an unforeseen stressful event.

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Table of Contents

List of Tables and Figures

Introduction

Measurement-Based Care (MBC) is considered to be an Evidence-Based Practice (EBP) by the American Psychological Association (APA, 2021) and Substance Abuse and Mental Health Services Administration (Lewis, et al., 2015). Generally, MBC consists of the following steps: routine administration of Patient-Reported Outcome Measures (PROMs) whose frequency intervals are determined by the parameters of the individual measures and patient/clinician goals. Next, clinicians review the patient data, ideally prior to each session, before patients review their data. Finally, clinicians and patients collaborate to inform and steer the course of treatment, as informed by the obtained data (Lewis, et al., 2015). A growing body of literature highlights the importance of utilizing MBC in behavioral healthcare settings (Fortney, et al., 2017). Despite this, MBC remains underutilized in the clinical community (Lewis, et al., 2019). One factor that makes MBC difficult to implement by behavioral health practitioners is regular compliance of PROMs. Since the rise of technological advances in the medical and behavioral health communities, the option for patients to receive care by means of telehealth has become more widely available (Wilson & Maeder, 2015). Specifically, since the sudden impact of the COVID-19 virus, many clinics were forced to make rapid transitions to telehealth (Demeke, et al., 2021). As the trend toward implementation of telehealth increases, it is important to understand possible barriers clinicians may face in providing EBPs. This paper seeks to call attention to the potential difficulty in implementing MBC in a telehealth setting by examining the relationship between PROM compliance in remote care versus a traditional in-person outpatient setting.

Measurement-Based Care (MBC)

MBC can be described as the evaluation of patient symptoms through systematic ongoing collaboration between patient and clinician to inform clinical decision-making (Lewis, et al.,

2019). Typically, this evaluation occurs using symptom-tracking measures administered to the patient on a consistent schedule (every session, bi-weekly, monthly, etc.). The frequency of the administration of these measures is determined by the chosen treatment modality, the diagnoses of the patient, and the parameters of each chosen measure. This schedule distinguishes MBC from Routine Outcome Monitoring (ROM), which generally occurs at a much lower frequency (e g., at just intake and discharge) and the goals of which are fundamentally different (Scott & Lewis, 2015).

The use of MBC in behavioral health settings is similar to effective repeated measurement approaches utilized by the medical community (e.g., collecting physiological data such as blood pressure, blood sugar, heartrate, etc., from a patient at regular intervals) to inform treatment and similarly, is associated with improved treatment outcomes as high as 60% (Fortney, et al., 2017). MBC has been shown to successfully assess psychiatric symptoms and overall psychological functioning, and track symptom change, thereby inducing improved clinical outcomes in patients (Lambert, 2015; Lambert, Whipple, & Kleinstäuber, 2018). More research is needed in order to determine precise mechanisms by which MBC acts; however, researchers have theorized possible mechanisms at both clinician and patient levels. The contextual feedback intervention theory posits that clinicians using MBC are more likely to experience cognitive dissonance when faced with the divergence of patient goals and actual patient symptom severities over time, thereby increasing the likelihood that clinicians will act quickly and effectively (Riemer & Bickman, 2011). The therapeutic assessment theory postulates that patients who were regularly assessed experience superior outcomes due to enhanced understanding of problems, increased engagement with the therapeutic process, and a higher level of therapeutic alliance (Finn & Tonsager, 1997).

Regarding the effectiveness of MBC in yielding positive clinical outcomes as compared to usual care, there is extensive data to suggest that MBC is superior (Fortney, et al., 2017). A meta-analysis which included over 200 clinicians and over 6000 patients found that patients randomly assigned to the MBC group showed significant improvements of clinical outcomes as compared to those assigned to the usual care group (Lambert, et al., 2002; Whipple, et al., 2003; Hawkins, et al., 2004; Harmon, et al., 2007; Slade, et al., 2008; Shimokawak, Lambert, & Smart, 2010). Two further meta-analyses, looking at a total of 39 additional studies, found that MBC yielded significantly better outcomes than patients receiving usual care (Kanup, 2009). Moreover, when MBC was delivered utilizing a structured feedback delivery system to providers during clinical encounters, interventions were most effective (Krägeloh, et al, 2015). Regarding remission, one study comparing MBC and usual care in an outpatient setting with a sample of patients diagnosed with depression found that remission rates were improved by 73.8% in those who received MBC (Guo, et al., 2015).

Patient Reported Outcome Measures (PROMs)

The primary tool by which the implementation of MBC in behavioral health settings is made possible, are PROMs (Resnick, et al., 2020). These questionnaires are generally completed by the patient autonomously, although, at times may be completed by family members. They provide a self-reported source of information regarding symptom severity which can be compared against, and used in conjunction with, clinician-provided symptom severity information. Due to the overwhelming evidence in support of using MBC, many PROMs have been developed, and are currently under development, for use in various intervention settings and with a wide array of psychopathologies represented (Alter, et al., 2021).

Although PROMs are a crucial part of MBC, there are barriers to regular utilization in mental healthcare settings. A systematic review of PROMs found that chief concerns from clinicians regarding implementation of PROMs include low perceived value of measures on outcomes/treatment planning, patient unwillingness/inability to complete measures, consumption of time needed to obtain feedback from measures, and perception that PROMs may negatively impact patients through interference of clinical time (Gelkopf, Mazor, & Roe, 2021). It is worth noting, however, that these complaints were often related to initial clinician resistance to the usage of PROMs. Another category of barriers was found to be related to logistical difficulties which included temporal constraints, staff availability/training, and challenges with information technology support.

The main barriers to the implementation of PROMs, however, are related to high attrition rates. While some of the difficulties involved are related to aforementioned provider issues, patient issues are also a major factor; patients may not show up to sessions or may not complete questionnaires, patients may be unwilling to complete questionnaires, and/or patients may be unable to complete questionnaires (Gelkopf, Mazor, & Roe, 2021). Additionally, studies found that regardless of the frequency of administration, the number of patients with data related to outcomes at the end of treatment remained the same, indicating that attrition rates were not related to frequency of PROM use (Mellor-Clark, Cross, Macdonald, & Skjulsvik, 2016). Most of the barriers described are related to accessibility of the instruments used and the data they yield. It is also possible that adults may have a higher rate of PROM completion than children. We know that adolescent patients' adherence to treatment interventions is cause for concern (Taddeo, Egedy, & Frappier, 2008) therefore it is also possible that adolescent compliance to

PROMs may be compromised. Unfortunately, literature on the subject of adult versus child PROM compliance is nearly nonexistent.

As the evidence supporting the regular utilization of PROMs in patient care has grown, a number of organizations in the United States, through the development of the Patient-Reported Outcomes Measurement Information System (PROMIS), have catalyzed the rapid growth of a wide range of measures to be used with diverse patient populations (Alter, et al., 2021). Despite this, barriers related to the routine implementation of PROMs in behavioral health settings are a major contributing factor to the low (<20%) integration of MBC into clinical practice (Hatfield & Ogles, 2007; Donaldson, 2008; Jensen-Doss & Hawley, 2011; Lavallee, Chenok, & Love, 2016; Lewis, et al., 2019). With the rise of technology, there are more advanced options for PROM patient data collection, input, and analysis that, along with the design of an MBC framework unique to each provider's needs, may increase feasibility of MBC implementation to providers with the resources to take advantage of these options (Gelkopf, Mazor, & Roe, 2021). With more diverse internet-based options for integrating PROMs with regular services, mental healthcare providers are also afforded the possibility of implementing telehealth with greater ease and effectiveness.

Telemental Health Services

Telemental health services arose due to the demand for increased accessibility for patients of different backgrounds, who might otherwise struggle to find care (Langarizadeh, et al., 2017). One of the main populations meant to benefit from telehealth are those living in distant/rural areas where providers either struggle to offer basic services, where services are too costly for the average patient to afford, or where mental health services do not exist. Through the implementation of telehealth by means of telephone and videoconferencing, providers have been

able to partially ameliorate access to mental healthcare in areas otherwise bereft (Hilty, et al., 2002; Young, 2005; Frantzidis, et al., 2010; Tang, et al., 2011). With access to care still a top priority for practitioners and clinical researchers alike, the exponential growth of technological advances has allowed for and prompted a focus on a more general trend toward telehealth (Langarizadeh, et al., 2017). The most common technologies implemented for telemedicine services are videoconferencing, telephone, and messaging based systems, web application-based interventions (e.g., text, video, animation, etc.), mobile phones, social media and forum discussion, simulated reality, and internet-based therapeutic games, all of which have been shown clinical effectiveness.

A meta-analysis of the clinical outcomes of telemental health interventions showed reduced to equal effects when compared with face-to-face interventions. However, even those reviews yielding reduced effects still reported significant reduction in symptom severity for patients participating in telehealth (Barnett, et al., 2021). Regarding patient attendance, rates of patient dropout from services, clinician satisfaction, therapeutic alliance, patient satisfaction, and convenience, all domains were comparable with face-to-face interventions with few exceptions.

While there are obvious benefits to telehealth, and innovations in modern technology allow for a diverse application for telemental health services, there are also challenges associated with the implementation of telehealth in a behavioral health setting. It is possible that (1) clinicians less familiar with technology do not possess the knowledge or skills required to effectively utilize telehealth technology, (2) clinics do not have necessary equipment or funds for equipment upgrades, (3) internet service and web-based application subscriptions may be too costly or too difficult to attain, and/or (4) clinics may not be able to devote staff to regularly assess the efficacy of teleservices (Christensen & Hickie, 2010). Regarding cost-effectiveness of

telemental health services, reviews yielded mixed findings with one showing that costs were comparable to face-to-face services (Hassan & Sharif, 2019) and another showing that telehealth was significantly less cost-effective than face-to-face services (Naslund, et al., 2020). Additionally, studies have presented mixed findings regarding patient adherence to telemental health interventions, with some showing equal rates of adherence to face-to-face interventions and others showing inferior adherence (Garcia-Lizana & Munoz-Mayorga, 2010; Dorstyn, Saniotis, & Sobhanian, 2013; Bolton & Dorstyn, 2015).

Telemental health services have evolved and expanded over the last few decades as innovations in technology have improved. With poor access to mental healthcare services in rural and low socioeconomic status patient populations being a critical issue, the development of telehealth is crucial for meeting the needs of patients on a widespread level (Nelson, 2017). Currently, there are still challenges keeping telemental health services from being offered on the level needed to solve the problem concerning rural access to care. Challenges such as possible low cost-effectiveness and high expense or scarcity of resources and training provide a paradoxical dilemma for practitioners at rural clinics. Additionally, providers must remain wary of the possibility of reduced effectiveness as compared to face-to-face care and reduced patient adherence to interventions. Clearly, however, the rapid growth of innovations in technology have allowed for reduced barriers as steadily greater numbers of clinics are introducing telehealth services, including a recent period of exponential increase in telehealth offerings due to the global COVID-19 pandemic (Wilson & Maeder, 2015; Barnett, et al., 2021; Demeke, et al., 2021).

Telehealth and COVID-19

The effects of the global COVID-19 pandemic on healthcare were immediate and striking. Health systems lost over $320 billion and over 50 hospitals closed or faced bankruptcy over the course of 2020 (American Hospital Association, 2020). Regarding mental healthcare specifically, studies have shown that the COVID-19 pandemic has had a profound impact on psychological health, with significant increases in anxiety, depression, and post-traumatic stress disorder symptom severity evident (Ettman, et al., 2020; Wang, et al., 2020; Xiong, et al., 2020). It is thought that the mechanisms by which COVID-19, and possibly future global crises, has had such a serious impact on mental health include an inability to obtain supplies for basic living and/or personal protection equipment, financial loss, fear of infection by the virus, confinement, and impeded personal freedoms creating added psychological distress (Brooks, et al., 2020; Serafini, et al., 2020; Wang, et al., 2020). These mechanistic factors coupled with patient reluctance and/or inability to attend face-to-face healthcare settings have resulted in significant hurdles in the delivery of mental health services during a global pandemic. One solution to overcome these hurdles is widespread implementation of telehealth.

As of 2019, prior to the start of the pandemic, the Health Resources and Services Administration released data showing that 43% of all health centers had the capability of offering telehealth services (Health Resources and Services Administration, 2019). Despite this relatively low number, 95% of healthcare centers were reported to be implementing telehealth services during COVID-19 (Demeke, et al., 2021). While the solution of utilizing telehealth during a pandemic or other similar global crisis is clearly an effective one, it must be highlighted that there are challenges related to such a rapid onset of telehealth services. Fifty-seven percent of health care centers were not listed as having the capability to offer telehealth, yet the majority of

those centers did so within a few months' notice. This indicates that centers were quick to respond to the needs of patient populations, even though there could not have been extensive planning and infrastructure building prior to the rollout of telehealth services. Furthermore, healthcare centers and patients located in rural areas, where access to care was already poor, dealt with an inordinate number of difficulties (e.g., too few providers, poor internet access, lack of communication devices, lack of technological training) which federal aid and guidance were not enough to completely overcome (Lin, et al., 2018; Park, et al., 2018; Weigel, et al., 2020).

Despite the challenges associated with implementing telemental health services during a global pandemic, the evidence supporting the use of telehealth clearly makes it a mostly viable solution to the resulting mental health crisis associated with COVID-19 and that may reasonably be expected with similar global emergencies in the future (Zhou, Snoswell, Harding, & Bambling, 2020). The question remains whether the lack of formal infrastructure and planning for telemental health services due to rapid implementation, for the majority of healthcare centers, will adversely affect regular integration of telehealth into future services. There is a large amount of evidence supporting the adoption of telemental health services in general, however, there is a distinct lack of literature covering the unique and ongoing situation that is COVID-19. Specifically, the rapid adoption of telehealth as a result of the COVID-19 pandemic required significant alterations to the therapeutic process (Torous & Wykes, 2020). An important consideration is the use of PROMs in MBC in conjunction with telehealth to reliably assess and track symptomatology in order to provide quality care for patients in need.

Telehealth and Measurement-Based Care

There are few studies examining the effectiveness of remote MBC in a telehealth setting. One metanalysis examined the use of remote MBC in the form of PROMs delivered

electronically in combination with face-to-face intervention, rather than looking at remote MBC in a fully telehealth intervention setting (Goldberg, et al., 2018). Another more recent review summarized evidence for the feasibility of MBC integration into telehealth services, however, it was unable to cite more than one study examining actual performance of MBC in a fully telehealth setting (Douglas, et al., 2020). The study, composed of 40 participants, found positive patient outcomes, as well as reduced barriers, when internet-delivered parent-child interaction therapy (I-PCIT) was utilized as compared to traditional in-person PCIT. The authors, however, acknowledged the small amount of literature on the subject of remote MBC and telemental healthcare (Comer, et al., 2017). Likely, the lack of literature on this subject is due to its novelty. While it seems reasonable to have a positive outlook on the role of remote MBC in telehealth, more research must be conducted in order to determine its viability and effectiveness.

Overview

MBC is an evidence-based practice whose effectiveness in improving clinical outcomes and reducing remission rates is well described in the behavioral health literature. Although the mechanisms by which MBC acts are not well understood, it is a relatively young field of research and will benefit from further studies. Despite MBC's well documented success in producing positive results when integrated into regular care, it is being utilized by a small minority of practitioners. It should be noted that there are a number of barriers reducing the practicality of implementing MBC. Many of these barriers are related to clinician and patient attitudes toward and logistical issues involving the use of PROMs and subsequent data collection, review, and use in-vivo.

PROMs, however, are the key component of MBC, therefore, any barriers related to the usage of these measures must be carefully considered. While clinicians are dubious toward the

practical routine use of PROMs in interventions, the main barrier reported by numerous clinics remains patient compliance with MBC protocols. Specifically, practitioners report issues with patients being unwilling and/or unable to complete PROMs. High attrition rates nullify the benefits of MBC by disallowing clinicians from regularly and actively reviewing assessment results with patients. With the increase in technological advances, however, accessibility of PROMs for providers and patients have increased. Clinicians are now able to administer measures by way of paper instruments or electronically, in the clinic or in the comfort of the patients' own homes. Researchers agree that these innovations at least partially reduce the barriers practitioners experience regarding MBC.

The advent of high-speed internet and affordable hardware and therapeutic software have also opened the door for clinicians to offer telemental health services in addition to traditional services. This is especially important for effectively reaching patient populations with limited access to care. Researchers generally agree that telehealth can be significantly effective in producing positive clinical outcomes, although some studies show a reduced effect when compared with face-to-face interventions. Additionally, some studies warn that adherence to the therapy process is reduced in telehealth settings. Furthermore, it is unclear if MBC can be effectively and efficiently implemented in a fully telehealth setting. Regardless, it is especially important for practitioners to consider offering telehealth services, especially considering the detrimental effects that the COVID-19 pandemic has had on psychological health across the world.

Many health clinics were forced to offer telehealth services without pre-existing infrastructure in place. Research agrees that for MBC to be viably and successfully implemented into mental healthcare on a widespread level, first, frameworks must be thoughtfully designed in

order to reduce as many barriers to its implementation as possible. Thus, it is likely that the few practitioners who did utilize MBC during the rapid transition to telehealth due to COVID-19 either did not have a solid framework in place or used frameworks not developed specifically for telemental health services.

In conclusion, we know that 1) MBC is a highly effective evidence-based practice taken advantage of by a minority of practitioners, 2) PROMs are the main tool required to effectively implement MBC, 3) patient compliance of completing PROMs is the major barrier to clinics utilizing them routinely, 4) technological innovations have allowed for the possibility of utilizing MBC in telehealth settings, 5) patient adherence to intervention in telehealth settings is a significant concern among clinicians, 6) in order for MBC to be successfully implemented in any setting, careful planning of therapeutic frameworks must occur, 7) the global COVID-19 pandemic caused a) a mental health crisis brought on by causing added distress and b) a rapid onset of telehealth services in a majority of clinics who months before were not reported as being capable of telehealth by the CDC, 8) the efficacy and viability of MBC in fully telehealth settings post global pandemic are unclear. It seems likely that due to the increased distress patients have experienced due to COVID-19, the mixed findings regarding patient adherence to teletherapy, and problems with PROM compliance in patients in general, that during COVID-19, PROM compliance might be significantly adversely affected.

Present Study

The present study seeks to elucidate a potential barrier to the implementation of MBC in fully telehealth settings by taking advantage of the unique situation provided by the global COVID-19. Specifically, the researcher will evaluate the potential within- and between-group differences of mean PROM compliance of patients involved in either intervention prior to or

during COVID-19 (modality), or both, through investigation of groups that: 1) experienced exclusively traditional in-person services prior to COVID-19, 2) experienced exclusively telehealth services during COVID-19, and 3) experienced in-person prior to COVID-19 and telehealth services during COVID-19. Additionally, because research regarding adult versus child (maturity) compliance is nearly nonexistent, therefore is a question mark in the study, the researcher will examine the potential between group difference of mean PROM compliance of adult and child patients as well as potential interaction between modality and maturity.

Hypotheses

1) It is expected that compliance of patients experiencing telehealth in filling out PROMS will be significantly reduced as compared to patients experiencing in-person services.
2) It is expected that compliance of adult and child patients will not differ significantly.
3) It is expected that the interaction of modality and maturity will not significantly affect compliance.
4) It is expected that the compliance of patients experiencing first in-person services and then telehealth services in filling out PROMs will decrease after switching from in-person to telehealth services.

Methods

Participants

Participants consisted of informants capable of filling out self-report PROMs or who served as a caregiver able to fill out the observer-report PROMs. They were recruited from a clinical population at a psychology training clinic at a major university. Participants who were physically or cognitively unable to complete PROMs were excluded from this study. Participants attended at least 3 sessions beyond the initial intake session in order to meet inclusion criteria for the study. The Institutional Review Board of Virginia Polytechnic Institute and State University approved this research design after receiving written informed consent from the participants. For detailed demographics, broken down by group, see Table 1.

Grouping

Participants were placed into one of three groups for the purpose of analysis of modality:

1) In-Person Services (Modality 1): In this group, participants (n = 17) attended sessions in-person, prior to the global COVID-19 pandemic, according to the procedure above. PROMs were administered prior to each session via either the participant's personal computer within 48 hours prior to the sessions or at the PSC clinic computer immediately prior to the session. The majority of participants identified as female (76.5%) and white (70.6%) and their mean age was 19.24 years (SD = 10.668, range = 7-48).
2) Telehealth Services (Modality 2): In this group, participants (n = 17) attended sessions over telehealth, by way of video conference and/or by phone. PROMs were administered prior to each session via the participant's personal computer. The majority of participants identified as female (82.4%) and white (82.4%) and their mean age was 24.12 years (SD = 13.220, range = 9-56).

3) Hybrid Modality (Modality 3): In this group, participants (*n* = 10) attended sessions in-person, prior to the global COVID-19 pandemic, for part of their intervention and attended sessions over telehealth, by way of video conference and/or by phone for the remainder of their sessions. Four clients from this group had previously attended sessions in-person over a different course of therapy at a different time period and were also included in Modality 1. PROMs were administered according to the standards described in the two conditions above. The majority of participants identified as female (80.0%) and white (70.0%) and their mean age was 21.80 years (SD = 9.647, range = 10-40).

Participants were placed into one of two groups for the purpose of analysis of maturity:

1) Adult: Participants (*n* = 23) >18 years of age. The majority of participants identified as female (69.6%) and white (65.2%) and their mean age was 28.87 years (SD = 9.716, range = 18-56).
2) Child: Participants (*n* = 17) <18 years of age. Informants in the child group were either the child patients themselves or their caregivers (in the event that the child patients were unable to fill out their own PROMs.) The majority of participants identified as female (94.1%) and white (82.4%) and their mean age was 11.76 years (SD = 2.611, range = 7-17).

Measures

Measures included any PROM repeated at a regular interval throughout therapy. PROMs completed varied from informant to informant and depended on the psychopathologies experienced by each individual patient as well as the treatment goals of each clinician and patient, as discussed in-session. PROMs completed on any irregular interval were not included in this study unless it could be verified each session that the measure were scheduled to be

completed. PROMs were assigned following the completion of the phone screen, prior to the initial intake session.

Procedure

Participants were recruited from a patient population at the Psychological Services Center (PSC) at Virginia Polytechnic Institute and State University. The PSC is a student training clinic where patients are offered therapeutic services by graduate clinicians. Participants in the in-person group were included if their last therapy sessions concluded prior to 01/01/2020. Participants in the telehealth group were included if their sessions were conducted after the 3/12/2020 governor's shelter in place order exclusively over telehealth. Participants in the hybrid group were included if they experienced in-person services prior to 3/12/2020 and switched over to telehealth services after 3/12/2020. Participants within each group were randomly selected. Prior to arrival to their initial intake session, participants completed a phone screen of basic symptomatology conducted by a student clinician other than their primary student clinician. After completion of the phone screen, participants were assigned PROMs to be completed 48 hours prior to the beginning of their session. Upon arrival at the PSC, participants attended their initial intake session and completed a written Informed Consent Form along with a Consent for Research form in order to participate in intervention and to agree that their deidentified data may be used for the purpose of conducting research, respectively. For child patients, caregivers filled out the forms. Participants were free to decline research consent. Only patients who consented to having their deidentified data used for the purpose of conducting research were used as participants in this study. Upon completion of the initial intake session, participants were instructed to continue to complete PROMs every session, whether they attended their scheduled session or not, in order for clinicians to track symptom severity and treatment progress.

For participants attending telehealth sessions, the above process remained the same except for the following: 1) patients did not attend any in-person sessions, rather, they attended sessions by way of video conference and/or telephone, 2) patients filled out consent forms electronically, 3) patients only were able to fill out PROMs from their personal computer prior to sessions.

Data Analysis Plan

An Exploratory Data Analysis was conducted using SPSS in order to determine and summarize the main characteristics of the dataset, assess assumptions of statistical inference, and support the use of the following statistical techniques. An a priori power analysis was conducted in GPower3. There were two independent variables and one dependent variable in this study. The first independent variable, modality, was broken down into modality 1 (pre COVID-19/in-person services), modality 2 (during COVID-19/telehealth), and modality 3 (hybrid of modalities 1 and 2). The second independent variable, maturity, was broken down into adult (18+ patients) and child (<18 patients/caregiver respondents). The dependent variable, compliance, was broken down into full compliance and partial compliance. Full compliance is defined as the total number of sessions where all PROMs were filled out divided by the total number of sessions multiplied by 100. A mean percentage of full compliance was yielded. Partial compliance is defined as the total number of sessions where at least one PROM was filled out divided by the total number of sessions multiplied by 100. A mean percentage of partial compliance was yielded.

All quantitative analyses are 2-tailed and were run on the Statistical Package for the Social Sciences (SPSS):

1) Hypotheses 1, 2, & 3: a two-way ANOVA was conducted in order to test 1) the difference in mean rates of compliance between participants exposed to the in-person

modality and participants exposed to the telehealth modality, 2) the difference in mean rates of compliance between adult participants and child participants/caregivers (maturity) and 3) for the interaction effect of modality and maturity on the mean rates of compliance. A significance level of .050 was used.

2) Hypothesis 4: a Paired Sample T-test was conducted in order to test the differences between mean rates of compliance of participants in the hybrid modality at two different timepoints. A significance level of .050 was used.

Qualitative Analysis

A qualitative content analysis was manually conducted following a set of published guidelines (Zhang & Wildemuth, 2009) to examine trends in progress notes of each participant. The qualitative analysis looked for common descriptions between different participants who may have missed sessions or neglected to fill out PROMs. The progress notes were chosen only from the telehealth sessions of patients in modalities 2 and 3. Progress notes at the psychological services center all share a common template between all clinicians; they are divided into four main sections of content: “Session Content,” “Assessment/Evaluation Data,” “Session Formulation,” and “Plan.” The “Assessment/Evaluation Data” section of the session note is the only section that gives information about PROMs. Qualitative data, specifically the text within each “Assessment/Evaluation Data” section of each session note, was manually obtained for each telehealth modality patient. After collection of the data, it was coded into recording units “Technical Difficulties,” “Life Event/Stressors,” “Forgot,” and “No Explanation. The “Technical Difficulties” code included any statements mentioning the OWL system, computer issues, internet issues, issues with email reminders, or general technical difficulties. The “Life Events/Stressors” code included any statement mentioning not completing PROMs in favor of

other activities, distracting life events, and excessive stress. The “Forgot” code included any statements mentioning forgetting, not remembering, or needing to be reminded to fill out PROMs. The “No Explanation” code included any statements where no cause for failure to fill out PROMs was recorded. “Assessment/Evaluation Data” sections of session notes are fairly standardized between clinicians at the psychological services center; therefore, all are brief and use similar language. The data was divided into different each of the four codes based on the criteria mentioned above before being quantified into different totals and percentages for each code.

Results

A Priori Power Analysis

Using GPower version 3.1.9.7 (Faul et al., 2007), an a priori was conducted for a two-way ANOVA with an alpha at .05. The analysis showed that in order to reach a power of .80 and small effect size (f = 0.10), a sample size of 787 participants would be needed. In order to reach a power of .80 and a medium effect size (f = 0.25), a sample size of 128 participants would be needed. In order to reach a power of 0.80 and a large effect size (f = 0.40), a sample size of 52 would be needed. A small sample of 34 participants was collected, therefore, effect sizes were interpreted and reported. For the two-way ANOVA, the partial Eta squared was used as the measure for effect size. Another power analysis was run for a two-tailed paired samples T Test at an alpha of .05. Results showed that 199 participants were needed to reach .80 power with a small effect size (d = 0.20), 34 participants was needed to achieve a power of .80 with a medium effect size (d = 0.50), and 15 participants was needed to achieve a power of .80 with a large effect size (d = 0.80). A small sample of 10 participants was collected, therefore, effect sizes were interpreted and reported. Additionally, Hedge's g (Hedges, 1981) was selected to report effect size in order to account for the small sample size.

Hypotheses 1, 2, and 3

Full Compliance

A two-way ANOVA was conducted to examine the effects of modality (telehealth and in-person therapy) and maturity (adulthood and childhood) on full compliance of PROMs. See Table 2 for descriptive statistics for the full compliance group. Residual analysis was conducted to verify the two-way ANOVA's assumptions. Boxplot inspection was used to identify outliers, Normal Q-Q plots were examined visually to determine normality, and Levene's test was used to

determine the homogeneity of variances. There were two outliers that were judged to be more than three box-lengths from the box's edge. These outliers were determined to be genuinely unusual values, not data entry or measurement errors. The analysis was run with and without the outliers included. The outliers were left in the analysis as they were determined not to have a significant effect on the analysis. Residuals were normally distributed as assessed by visual inspection of Normal Q-Q Plots and there was homogeneity of variances (p = .078).

The interaction effect between modality and maturity on full compliance was not statistically significant, $F(1, 30) = 1.407$, $p = .245$, partial $\eta^2 = .045$. Therefore, analyses of the main effects for modality and maturity were performed. See Table 4 for interaction effects and main effects. The main effect was statistically significant, according to the analysis of modality's main effect, $F(1, 30) = 15.969$, $p < .001$, partial $\eta^2 = .347$. All pairwise comparisons were performed with adjusted Bonferroni p-values and reported 95% confidence intervals. For in-person and telehealth child and adult patients, the unweighted marginal means of "full compliance" scores were 92.205 (SE = 4.916) and 64.223 (SE = 4.986), respectively. The main effect for maturity was statistically significant, according to analysis of the main effect, $F(1, 30) = 6.468$, $p = .016$, partial $\eta^2 = .177$. All pairwise comparisons were performed with adjusted Bonferroni p-values and reported 95% confidence intervals. For adult and child patients experiencing in-person and telehealth services, the unweighted marginal means of “full compliance” scores were 87.119 (SE = 4.649) and 69.310 (SE = 5.237), respectively.

An in-person therapeutic modality yielded a mean “full compliance” score 27.982, 95% CI [13.681, 42.283] points greater than a telehealth therapeutic modality, a statistically significant difference, $p < .001$. Adulthood yielded a mean “full compliance” score 17.809, 95% CI [3.508, 32.110] points greater than childhood, a statistically significant difference, $p = .016$.

See Figure 1 for main effects of modality and maturity on full compliance. *Note:* an ANCOVA including the variable “total sessions” as a covariate was conducted. Total sessions indicated the total number of therapy sessions attended by each participant. The two-way interaction effect between modality and maturity on full compliance, whilst controlling for total sessions, was not statistically significant p = > .050. The main effect for modality was statistically significant, p = <.001. and the main effect for maturity was statistically significant, p = <.050.

Partial Compliance

A two-way ANOVA was conducted to examine the effects of modality (telehealth and in-person therapy) and maturity (adulthood and childhood) on partial compliance of PROMs. See Table 3 for descriptive statistics for partial the compliance group. Residual analysis was conducted to verify the two-way ANOVA's assumptions. Boxplot inspection was used to identify outliers, Normal Q-Q plots were examined visually to determine normality, and Levene's test was used to determine the homogeneity of variances. There were two outliers that were judged to be more than three box-lengths from the box's edge. These outliers were determined to be genuinely unusual values, not data entry or measurement errors. The analysis was run with and without the outliers included. The outliers were left in the analysis as they were determined not to have a significant effect on the analysis. Residuals were normally distributed as assessed by visual inspection of Normal Q-Q Plots and there was homogeneity of variances (p = .082).

The interaction effect between modality and maturity on partial compliance was not statistically significant, $F(1, 30) = .365$, $p = .550$, partial $\eta^2 = .012$. Therefore, analyses of the main effects for modality and maturity were performed. See Table 5 for interaction effects and main effects. The main effect was statistically significant, according to the analysis of modality’s main effect, $F(1, 30) = 12.919$, $p < .001$, partial $\eta^2 = .301$. All pairwise comparisons were

performed with adjusted Bonferroni *p*-values and reported 95% confidence intervals. For in-person and telehealth child and adult patients, the unweighted marginal means of "partial compliance" scores were 93.060 (*SE* = 4.613) and 69.446 (*SE* = 4.678), respectively. The main effect for maturity was statistically significant, according to analysis of the main effect, $F(1, 30) = 5.341$, $p = .028$, partial $\eta^2 = .151$. All pairwise comparisons were performed with adjusted Bonferroni *p*-values and reported 95% confidence intervals. For adult and child patients experiencing in-person and telehealth services, the unweighted marginal means of “partial compliance” scores were 88.845 (*SE* = 4.362) and 73.661 (*SE* = 4.913), respectively.

An in-person therapeutic modality yielded a mean “partial compliance” score 23.614, 95% CI [10.197, 37.021] points greater than a telehealth therapeutic modality, a statistically significant difference, $p < .001$. Adulthood yielded a mean “partial compliance” score 15.184, 95% CI [1.766, 28.601] points greater than childhood, a statistically significant difference, $p = .028$. See Figure 2 for main effects of modality and maturity on partial compliance. *Note:* an ANCOVA including the variable “total sessions” as a covariate was conducted. Total sessions indicated the total number of therapy sessions attended by each participant. The two-way interaction effect between modality and maturity on partial compliance, whilst controlling for total sessions, was not statistically significant p = > .050. The main effect for modality was statistically significant, p = <.001. and the main effect for maturity was statistically significant, p = <.050.

Hypothesis 4

Full Compliance

A paired-samples t-test was used to determine whether there was a statistically significant mean change in full compliance from when participants were under the in-person modality

compared to after they switched to the telehealth modality. One outlier was detected that were more than 1.5 box-lengths from the edge of the box in a boxplot. This outlier was determined to be a genuinely unusual value, not a data entry or measurement error. Inspection of its value did not reveal it to be extreme and it was kept in the analysis. The assumption of normality was not violated, as assessed by Shapiro-Wilk's test (p = .439). Participants showed higher full compliance when being treated under the in-person modality (M = 91.210, SD = 15.562) as opposed to the telehealth modality (M = 53.460, SD = 21.663), a statistically significant mean decrease of 37.750, 95% CI [26.050, 49.450], $t(9) = 7.300$, $p < .001$, Hedge's g = 2.109. Hedge's g was used as a measure of effect size instead of Cohen's d due to the small sample size. See Table 6 for significance and effect size.

The mean change was statistically significantly different from zero. Therefore, we can reject the null hypothesis and accept the alternative hypothesis. See Figure 3 for pre- and post-telehealth mean full compliance.

Partial Compliance

A paired-samples t-test was used to determine whether there was a statistically significant mean change in partial compliance from when participants were under the in-person modality compared to after the switched to the telehealth modality. There were no outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box-lengths from the edge of the box. The assumption of normality was not violated, as assessed by Shapiro-Wilk's test (p = .098). Participants showed higher partial compliance when being treated under the in-person modality (M = 93.980, SD = 10.168) as opposed to the telehealth modality (M = 54.750, SD = 21.712), a statistically significant mean decrease of 39.229, 95% CI [26.219, 52.240], $t(9) = 6.821$, $p <$

.001, Hedge's g = 1.971. Hedge's g was used as a measure of effect size instead of Cohen's d due to the small sample size. See Table 6 for significance and effect size.

The mean difference was statistically significantly different from zero. Therefore, we can reject the null hypothesis and accept the alternative hypothesis. See Figure 4 for pre- and post-telehealth mean partial compliance.

Qualitative Analysis

The results of this content analysis of clinical progress notes in a student training clinic are reported in order to examine possible qualitative relationships between patients experiencing telehealth and failing to fill out PROMs. "Assessment/Evaluation Data" sections of all clinical progress notes for all sessions where patients experiencing the telehealth failed to complete their measures, were coded and assessed for potential barriers to completion of PROMs. Of the 119 "Assessment/Evaluation Data" sections, taken from 22 patients (9 child, 13 adult), that met inclusion criteria for content analysis, 1 (1%) was categorized as "Forgot," 4 (3%) were categorized as "Life Events/Stressors," 25 (21%) were categorized as "Technical Difficulties," and 89 (75%) were categorized as "No Explanation." See Table 7 for all quantified qualitative data.

Discussion

Measurement-Based Care (MBC) is a transtheoretical and transdiagnostic evidence-based practice involving the consistent collaboration between clinicians and their patients to inform multiple aspects of the clinical decision-making process (Lewis, et al., 2015; Lewis, et al., 2019) that has been garnering increased attention and study over the past few decades. A growing body of literature has shown the benefit of implementing MBC in inpatient and outpatient settings, showing significantly superior outcomes as compared to usual care (Lambert, et al., 2002; Whipple, et al., 2003; Hawkins, et al., 2004; Harmon, et al., 2007; Slade, et al., 2008; Shimokawak, Lambert, & Smart, 2010; Fortney, et al., 2017). Despite the evidence highlighting the usefulness of MBC, it has been sparsely implemented in the therapeutic community. One factor critical to the execution of MBC are Patient Reported Outcome Measures (PROMs), validated measures intended to address symptom severity or other concerns relevant to the therapy process. While PROMs serve as the foundation for successful of MBC, they are also a major barrier to its implementation, causing an obvious dilemma. Specifically, poor PROM compliance is a concrete impediment to systematic feedback by which MBC is thought to be effective. Additionally, the ability to conduct meaningful research on MBC becomes hampered due to missing data. It has been shown that although provider resistance and logistical difficulties contribute to limited PROMs implementation, the main barriers are related to high attrition rates on the part of patients (Gelkopf, Mazor, & Roe, 2021). Through technological advancement, it has become possible for providers to implement MBC in telehealth settings through electronic administration of PROMs. Although telehealth has been touted as a way to increase access to care for underrepresented patients, patient adherence to interventions is of concern (Garcia-Lizana & Munoz-Mayorga, 2010; Dorstyn, Saniotis, & Sobhanian, 2013; Bolton & Dorstyn,

2015). In a clinic using MBC, PROM compliance is a part of patient adherence. Success of telehealth and MBC more specifically requires careful planning of therapeutic frameworks, however, the global COVID-19 pandemic that cause a lockdown in March of 2020 a mental health crisis and sudden onset of telehealth in clinics who had previously been reported by the CDC as not being capable of appropriately offering telehealth services (Health Resources and Services Administration, 2019). Given the factors mentioned above, it is reasonable to question the effectiveness and feasibility of MBC in a post global pandemic fully telehealth setting. Therefore, this study aimed to better understand a potential major barrier to MBC in fully telehealth settings as a greater number of clinics move toward offering telemental health services by examining the relationships between therapeutic modality and patient compliance of PROMs.

Findings for the dependent variables, full compliance and partial compliance, as defined in the Methods section of this paper, were the same for all of the analyses conducted, therefore, for the sake of discussion, the terms full compliance and partial compliance will be combined into the single term compliance.

Hypothesis 1

It was expected that compliance of patients experiencing telehealth services (modality 2) in filling out PROMs would be significantly reduced as compared to patients experiencing in-person services (modality 1) (hypothesis 1). This hypothesis was supported as the mean PROM compliance of patients in modality 2 was significantly lower than patients in modality 1. Additionally, a large effect size was found. This means that patients who experienced telehealth were less likely to consistently complete PROMs assigned to them over the course of treatment than patients who experience in-person services. The large effect size indicates that a large percentage of the change in compliance can be accounted for by the modality experienced by the

patients. Although the sample size for this study was relatively low, as compared to other clinical samples, the large effect size indicates that the study had high statistical power.

Prior research shows that a major barrier to the implementation of MBC in clinics is PROM compliance. Specifically, studies of the utilization of PROMs found that patients are often unwilling or unable to complete their assigned measures (Gelkopf, Mazor, & Roe, 2021) and that patient barriers to completing PROMs is the main hurdle MBC faces. In order for the patient and the clinician to work together collaboratively, they must have data regarding the patient's progress in therapy. This data comes in large part from PROMs. It is therefore logical to infer that the lower rates of compliance we observed in patients who were receiving telehealth services may represent that practices attempting to implement MBC in a telehealth setting may face challenges.

It is important to note, however, that although we can say that patients receiving telehealth services had lower rates of PROM compliance than patients receiving in-person services, we cannot make any claims as to the cause of this difference. A major consideration when discussing these findings is that the switch to telehealth was not planned, rather, the COVID-19 pandemic occurred and the clinic at which the study was conducted had to make an abrupt shift from fully in-person services to fully telehealth services. We know that in order for MBC to be successful, whether in-person or over telehealth, frameworks must be carefully developed in order to reduce barriers to implementation (Gelkopf, Mazor, & Roe, 2021). The clinic where this study occurred did not have the time to develop these frameworks, thus, it is likely that difficulties associated with MBC could be expected. At the same time, the clinic has a preexisting framework for the utilization of MBC, even if it was not designed with telehealth services in mind. Another important factor is the COVID-19 pandemic itself. The pandemic has

been associated with extreme welfare and mental health crises (American Hospital Association, 2020; Ettman, et al., 2020; Wang, et al., 2020; Xiong, et al., 2020). It is possible that the increased psychological distress faced by both patients and clinicians played a part in PROM noncompliance in the telehealth modality. Thus, we are not able to determine whether telehealth, a sudden unprepared switch to telehealth, the COVID-19 pandemic, or any possible combinations of these factors are associated with the decreased rate of PROM compliance.

Hypothesis 2

We considered the possibility that adult patients and child/adolescent patients may have different rates of compliance to PROMs. We hypothesized that the compliance of adult and child patients (maturity) would not differ significantly. This hypothesis was not supported. The mean PROM compliance of child patients and their caregivers was significantly lower than that of adult patients. Additionally, a large effect size was found. This means that child patients were less likely to consistently complete PROMs assigned to them over the course of treatment than adult patients. The large effect size indicates that a large percentage of the change in compliance can be accounted for by maturity of the patients. Although the sample size for this study was relatively low, as compared to other clinical samples, the large effect size indicates that the study had high statistical power.

There is a distinct lack of literature detailing potential differences between adult and child patients regarding PROM compliance. It is generally accepted that when people are given personal responsibility and autonomy for tasks, attitudes and outcomes associated with those tasks improve (Brown, 2009; Cheng & Hsu, 2012; Daniels, Radil, & Goegan, 2017; Johannsen & Zak, 2020). Therefore it is possible that because the majority of child and adolescent patients had primary PROMs filled out by their caretaker who had less personal responsibility for the

task, we saw lower rates of PROM compliance in child and adolescent patients. We also know that adolescent patients' adherence to therapeutic interventions is a cause for concern among clinicians (Taddeo, Egedy, & Frappier, 2008). Thus, it is also possible that adolescent patients' proposed reluctance to engage in therapy may have been associated with their lower PROM compliance rates as opposed to adult patients. Unfortunately, our sample size was too small to investigate differences in mean compliance of adolescent patients who were responsible for their own measures versus child patients for whom PROMs were completed by caregivers. It is also possible burdens and mental health issues experienced by caregivers during the COVID-19 pandemic (Russell et al., 2020) are associated with the decreased compliance in child patients. Future studies may focus on age as a possible factor in PROM compliance in patients. This would be helpful in identifying which age groups are more or less likely to exhibit good PROM compliance. Additionally, this would be helpful in establishing wether telehealth services are appropriate for patients of all ages, or, if it might be more effective offered to specific aged populations. Future studies might also aid in the development of specialized telehealth procedures for children, adolescents, adults, and any other age groups deemed to have different rates of compliance from one another.

Hypothesis 3

We also considered that the potential effect of modality on PROM compliance might depend on maturity. We also hypothesized that the interaction between modality and maturity would not significantly affect compliance. This hypothesis was supported as the difference in mean PROM compliance of patients was not significantly affected by the interaction of modality and maturity. A medium/large effect size was found. This means that the main effects of modality and maturity were not dependent one another. PROM compliance of patients who

experienced telehealth services was lower than compliance of patients who experienced in-person services regardless of maturity. Likewise, PROM compliance of child patients was lower than compliance of adult patients, regardless modality. The medium/large effect size may indicate that with a larger sample size, the interaction of modality and maturity may significantly affect the mean compliance of patients.

There is no research on the potential combined effects of modality and maturity on PROM compliance. Given the large effect size yielded by this study, it would be prudent for future researchers to repeat this portion of the study with a larger sample size. Additionally, the researchers should keep in mind the various factors mentioned in the discussion of Hypothesis 1 and Hypothesis 2 as possible moderators to the relationship between modality and maturity on PROM compliance.

Hypothesis 4

It was expected that for patients in the hybrid modality, mean compliance of completing PROMs would decrease after switching from in-person to telehealth services. This hypothesis was supported as the mean compliance of PROM completion was significantly lower after patients switched from in-person services to telehealth services. A large effect size was found. This means that patients were more likely to complete PROMs prior to COVID-19 causing the switch to telehealth. The large effect size indicates that the mean difference in compliance between the two timepoints was meaningful.

These results support the findings discussed for Hypothesis 1. A recent meta-analysis found that prior work experience was a poor predictor for performance (Van Iddekinge et al., 2019). Therefore, it is unsurprising that patients who first experienced the in-person modality and then experienced the telehealth modality would have lower mean compliance after the

switch to telehealth, even though they already had prior experience filling out PROMs. Originally, we planned to investigate the possible difference in mean compliance between patients in the hybrid modality, patients in the in-person modality, and patients in the telehealth modality. However, there was a very small sample of hybrid modality patients available, thus the analysis was not conducted. Future studies should try to achieve a larger sample size of patients experiencing the hybrid modality, possibly through collaboration with other clinics, in order to investigate whether there was a difference in mean PROM compliance between patients experiencing the modalities described above. Such studies may reveal possible effects of prior exposure to, and training for the completion of, PROMs on compliance. This could be beneficial in determining possible strategies for increasing PROM compliance in patients offered telemental health services. Additionally, future studies may to investigate the mean compliance of patients who experienced a random mix of telehealth services and in-person services as this type of hybridized modality will become increasingly common as telemental health services are offered more readily.

Qualitative Analysis

We were hopeful that by conducting a manual qualitative analysis through the examination of clinicians' "Assessment/Evaluation Data" sections of progress notes for patients who experienced the telehealth modality and had less than 100% PROM compliance, we might elucidate some of the factors associated with a reduction in PROM compliance. Unfortunately, we ran into an unanticipated problem. Three-quarters of progress notes failed to specify any reason for patients failing to fill out PROMs for any given session. It is possible that clinicians were less vigilant in their record keeping for that particular information than was usual due to the ongoing COVID-19 pandemic. It is also possible that due to procedural drift and the importance

placed on the training of other potentially more important areas of clinical work, that this information simply is not readily available at our clinic. A potential solution to this is to retrain clinicians on a regular interval on how to complete the "Assessment/Evaluation Data." It may also help to regularly audit clinicians' progress notes and train clinical supervisors to flag any progress notes that appear to be missing this potentially relevant data prior to signing them. Given the importance of PROM completion to successful utilization of MBC, it would seem prudent for clinics relying heavily on MBC interventions to keep careful track of why patients may fail to fill out measures.

Nearly a quarter of all progress notes described technical difficulties as a reason for failing to fill out PROMs. This is not surprising considering that it is well know that there are many potential issues associated with the tools that make telemental health services possible (e.g., computers, software) and peoples' ability to use them (Christensen & Hickie, 2010). Depending on the software used to administer PROMs, more or less technical support may need to be offered in order to ameliorate issues related to technical difficulties and failure to fill out PROMs. Knowing that technical difficulties may be a primary barrier to implementation of PROMs, it might be prudent for clinics to pay particular attention to and develop detailed protocols for the use of technology in the delivery of MBC. It may also be that certain populations who either do not have the means to access computers reliably or do not have the capability to use computers easily are particularly likely to have difficulty in completing PROMs in a telehealth setting. Future studies may determine factors associated with difficulty reliably using computer and/or advanced software and examine the potential relationship between those factors and PROM compliance.

Limitations

There were several limitations of the current study. First, COVID-19 was a chaotic and obviously unplanned event, therefore, it was extremely difficult to control any aspects of the study. We saw the COVID-19 pandemic as a unique opportunity to gain valuable information however recognized that because of its worldwide effects, we would have a very limited sample and thus a limited number of questions that we could ask of the data. We were unable to determine if any of the variance in mean compliance of PROMs was due to patients experiencing the telehealth modality, the underprepared abrupt switch to telehealth, the global pandemic, or any combination of these factors. The Health Resources and Services Administration showed that only 43% of all health centers had the capability of offering telehealth services (Health Resources and Services Administration, 2019). It is possible that any of the health centers that were capable of offering telehealth services would not have seen a difference in mean compliance of PROMs between patients experiencing in-person therapy and patients experiencing telehealth. Future research can elucidate possible associations between telehalth and PROM compliance under controlled conditions as well as possible associations between excessive stress and PROM compliance in order to better understand barriers to implementation of MBC.

Due to our small sample size, we were unable to include various factors that may have had moderating or mediating effects on our independent variables. For example, depression is associated with a lack of motivation (American Psychiatric Association, 2013) and is one of the most commonly occurring psychiatric disorders, therefore, it is possible differences in mean compliance between modalities may be affected by instances of depression. It may also be possible that other psychiatric disorders are associated with higher or lower rates of mean

compliance of PROM completion. Unfortunately, our sample size was too small to include primary diagnosis as a variable. Additionally, it may be possible that high symptoms severities might be associated with poor adherence to intervention therefore affecting the mean compliance of PROMs between modalities. Unfortunately, fewer than half of participants had documented clinical severity ratings and this variable could not be included in the analysis. Furthermore, while the interaction between maturity and modality may not have been statistically significant, the medium/large effect size indicated that a larger sample may have yielded significant results. If this was the case, it may be possible that the effect of modality on mean PROM compliance may be affected by maturity. By recruiting a large and diverse sample, many potential interactions between variables likely to have an effect on mean compliance of PROMs could be investigated in future studies.

Strengths

This study was a timely addition to the literature, considering the rarity of globalwide events such as the COVID-19 pandemic and the relatively recent rise in telemental health services being offered (Langarizadeh, et al., 2017). Because of these events, our sample is relatively unique, even though it is small. While we cannot make claims about the cause of the difference in mean rates of compliance of PROM completion, our findings indicate that PROM compliance is susceptible to significant variation and that any clinics implementing, or planning on implementing, MBC may realistically face challenges in doing so. Additionally, negative consequences of our small samples size may be at least partially ameliorated by large effect sizes for all significant findings.

Implications

Two things regarding the current state of psychological health services are clear: 1) telemental health services are being offered at an increasing rate due to innovations in technology trivializing the expense and difficulty of implementing such services (Langarizadeh, et al., 2017) and 2) Measurement-Based Care has been shown by a large body of literature to be a high effective transtheoretical and transdiagnostic evidence-based practice being adapted by increasing numbers of clinics (Lewis, et al., 2015; Lewis, et al., 2019). Our findings may be used as a reminder and wakeup call to practices, clinics, and hospitals everywhere, that implementation of telemental health services and MBC may be encountered by numerous barriers. These potential barriers must be identified by future research and addressed in order to build a sound framework and infrastructure for the succcessful implementation of MBC and telehealth. Future studies may accomplish identification of these barriers by conducting a more indepth analysis of PROM compliance rates in controlled populations of patients experiencing in-person services and patients experiencing telehealth services. Furthermore, future studies should seek to explore the potential relationship between modality and PROM compliance with clinical outcomes. Given the importance of PROMs to the fundamental theoretical framework of MBC as an evidence-based practice, it stands to reason that reduced compliance rates associated with a specific modality may also be associated with poorer clinical outcomes. The findings of such studies may aid in the development of more robust evidence-based practices specifically designed for telehealth services, thereby potentially allowing for the increasing number of people suffering from psychiatric disorders to have greater access to efficacious treatments in the future.

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Tables

Table 1. *Demographics Characteristics*

		Modality 1 (N = 17)	Modality 2 (N = 17)	Modality 3 (N = 10)	Adult (N = 23)	Child (N = 17)
Age		19.24 (10.668)	24.12 (13.22)	21.80 (9.647)	28.87 (9.716)	11.76 (2.611)
	Range	7-48	9-56	10-40	18-56	7-17
Total Sessions		15.24 (8.445)	20.00 (11.169)	28.60 (14.308)	21.87 (12.517)	17.88 (1.228)
	Range	5-31	4-40	9-54	6-54	4-44
Total Diagnoses		2.24 (1.251)	2.65 (1.320)	2.60 (1.075)	2.48 (1.238)	2.59 (1.228)
	Range	0-4	1-5	1-4	0-5	1-5
Biological Sex						
	Female	13 (76.5%)	14 (82.4%)	8 (80.0%)	16 (69.6%)	16 (94.1%)
	Male	4 (23.5%)	3 (17.6%)	2 (20.0%)	7 (30.4%)	1 (5.9%)
Race/ Ethnicity						
	White	12 (70.6%)	14 (82.4%)	7 (70.0%)	15 (65.2%)	14 (82.4%)
	Black/African American	-	1 (5.9%)	1 (10.0%)	-	2 (11.8%)
	Asian/Pacific Islander	-	2 (11.8%)	-	2 (8.7%)	-
	Middle Eastern	1 (5.9%)	-	1 (10.0%)	2 (8.7%)	-
	Multiracial	2 (11.8%)	-	-	1 (4.3%)	1 (5.9%)
	Not Answered	1 (5.9%)	-	-	1 (4.3%)	-
	Other	1 (5.9%)	-	1 (10.0%)	2 (8.7%)	-
Primary Diagnosis						
	ADHD	1 (5.9%)	2 (5.9%)	-	-	3 (17.6%)
	ASD	-	2 (11.8%)	-	-	2 (11.8%)
	DMDD	-	1 (5.9%)	1 (10.0%)	-	1 (5.9%)
	GAD	7 (41.2%)	5 (29.4%)	3 (30.0%)	12 (52.2%)	3 (17.6%)
	Lifestyle Prob	1 (5.9%)	-	1 (10.0%)	1 (4.3%)	-
	MDD	-	-	1 (10.0%)	1 (4.3%)	-
	OCD	1 (5.9%)	-	1 (10.0%)	1 (4.3%)	1 (5.9%)
	ODD	-	2 (11.8%)	1 (10.0%)	-	2 (11.8%)
	PDD	2 (11.8%)	2 (11.8%)	-	3 (13.0%)	1 (5.9%)
	PTSD	-	3 (17.6%)	2 (20.0%)	3 (13.0%)	1 (5.9%)
	SA	2 (11.8%)	-	-	-	2 (11.8%)
	Somatic	1 (5.9%)	-	-	1 (4.3%)	-
	Other Problem	1 (5.9%)	-	-	-	1 (5.9%)
	None	1 (5.9%)	-	-	1 (4.3%)	-

Notes: Modality 1 = In-Person, Modality 2 = Telehealth, Modality 3 = Hybrid, Adult = ≥18 years of age, Child = <18 years of age.

Table 2. *ANOVA Descriptive Statistics for Full Compliance*

Modality	Maturity	*M*	*SD*	*n*
In-Person	Adult	96.957	6.097	9
	Child	87.454	13.322	8
	Total	92.485	10.961	17
Telehealth	Adult	77.281	24.375	10
	Child	51.166	29.995	7
	Total	66.527	29.105	17
Total	Adult	86.601	20.383	19
	Child	70.519	28.731	15
	Total	79.506	25.348	34

Note: Modality 1 = In-Person, Modality 2 = Telehealth

Table 3. *ANOVA Descriptive Statistics for Partial Compliance*

Modality	Maturity	*M*	*SD*	*n*
In-Person	Adult	98.667	4.000	9
	Child	87.454	13.322	8
	Total	92.485	10.961	17
Telehealth	Adult	77.281	24.375	10
	Child	51.166	29.995	7
	Total	66.527	29.105	17
Total	Adult	86.601	20.383	19
	Child	70.519	28.731	15
	Total	79.506	25.348	34

Note: Modality 1 = In-Person, Modality 2 = Telehealth

Table 4. *ANOVA Summary Table for Full Compliance*

Source	*df*	*F*	*p*	η^2
Modality	1	15.969	<.001***	.347
Maturity	1	6.468	.016*	.177
Modality*Maturity	1	1.407	.245	.045

Note: Effect size = partial η^2. Small effect size: $\eta^2 = 0.010$, medium effect size: $\eta^2 = 0.060$, large effect size: $\eta^2 = 0.140$ * = $p<.050$, *** = $p<.001$

Table 5. *ANOVA Summary Table for Partial Compliance*

Source	*df*	*F*	*p*	η^2
Modality	1	12.919	.001***	.301
Maturity	1	5.341	.028*	.151
Modality*Maturity	1	0.365	.550	.012

Note: Effect size = partial η^2. Small effect size: $\eta^2 = 0.010$, medium effect size: $\eta^2 = 0.060$, large effect size: $\eta^2 = 0.140$. * = $p<.050$, *** = $p<.001$

Table 6. *Paired Samples T Tests for Pre-/Post-telehealth Compliance*

Compliance	*M* (Pre)	*SD*	*M* (Post)	*SD*	*t*	*p*	Hedge's *g*
Full	91.210	15.562	53.460	21.663	7.800	<.001***	2.109
Partial	93.980	10.168	54.750	21.712	6.821	<.001***	1.971

Note: This table shows the difference of means of full and partial compliance at two different timepoints. In the pre-telehealth timepoint, patients were experiencing in-person services. In the post-telehealth timepoint, patients were experiencing telehealth services. Effect size = Hedge's *g*; selected to correct for small sample size *n = 10*. Small effect size: *g* = 0.200, medium effect size *g* = 0.500, large effect size: *g* = 0.800. *** = *p*<.001

Table 7. *Qualitative Content Analysis – Quantified Qualitative Data*

Patient	Maturity	Total	TD	LE/S	F	NE
Patient 1	Adult	3	3	0	0	0
Patient 2	Adult	6	1	1	0	4
Patient 3	Adult	5	0	0	0	5
Patient 4	Adult	1	1	0	0	0
Patient 5	Adult	1	0	0	0	1
Patient 6	Adult	5	3	0	0	2
Patient 7	Adult	1	0	1	0	0
Patient 8	Adult	7	0	0	0	7
Patient 9	Adult	2	0	0	0	2
Patient 10	Child	4	0	0	0	4
Patient 11	Child	6	2	0	0	4
Patient 12	Child	4	0	0	0	4
Patient 13	Child	4	4	0	0	0
Patient 14	Child	14	0	0	0	14
Patient 15	Child	3	2	1	0	0
Patient 16	Child	12	8	0	1	3
Patient 17	Adult	10	0	0	0	10
Patient 18	Child	16	0	0	0	16
Patient 19	Adult	2	0	1	0	1
Patient 20	Adult	3	0	0	0	3
Patient 21	Adult	3	0	0	0	3
Patient 22	Child	7	1	0	0	6
Total Notes		119	25	4	1	89
Percentage of Total Notes			21%	3%	1%	75%

Notes: All progress notes were collected from telehealth sessions. Total = total notes from sessions where patients failed to fill out PROMs. TD = Technical Difficulties code. LE/S = Life Events/Stressors code. F = Forgot code. NE = No Explanation code.

Figures

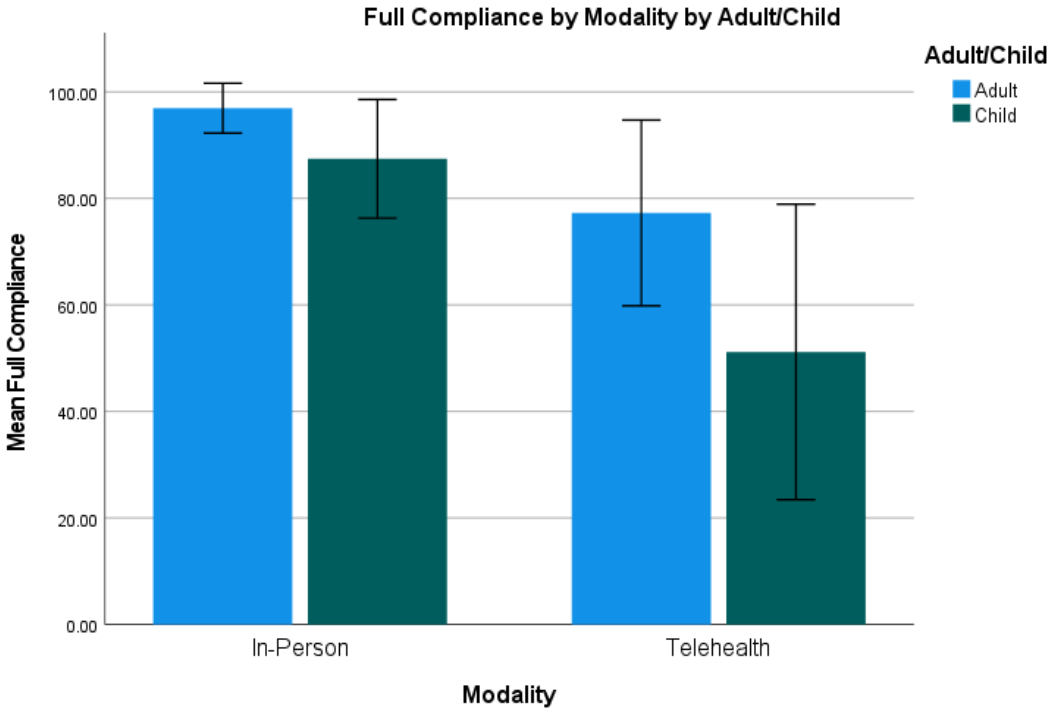

Figure 1 Modality 1 = In-Person. Modality 2 = Telehealth.

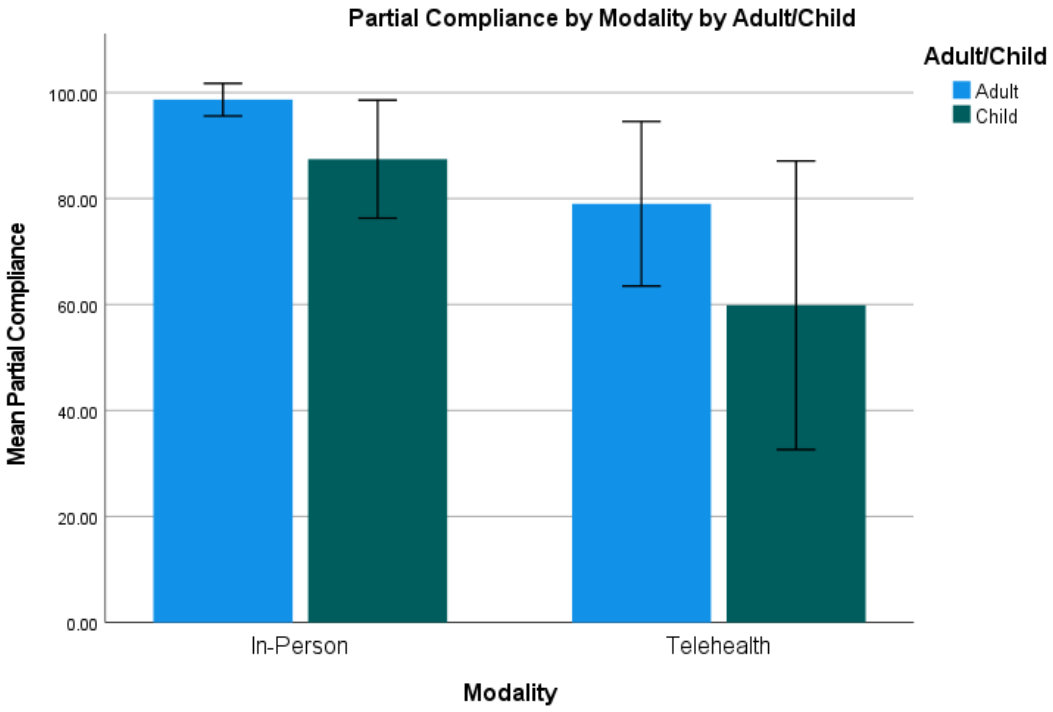

Figure 2 Modality 1 = In=Person. Modality 2 = Telehealth.

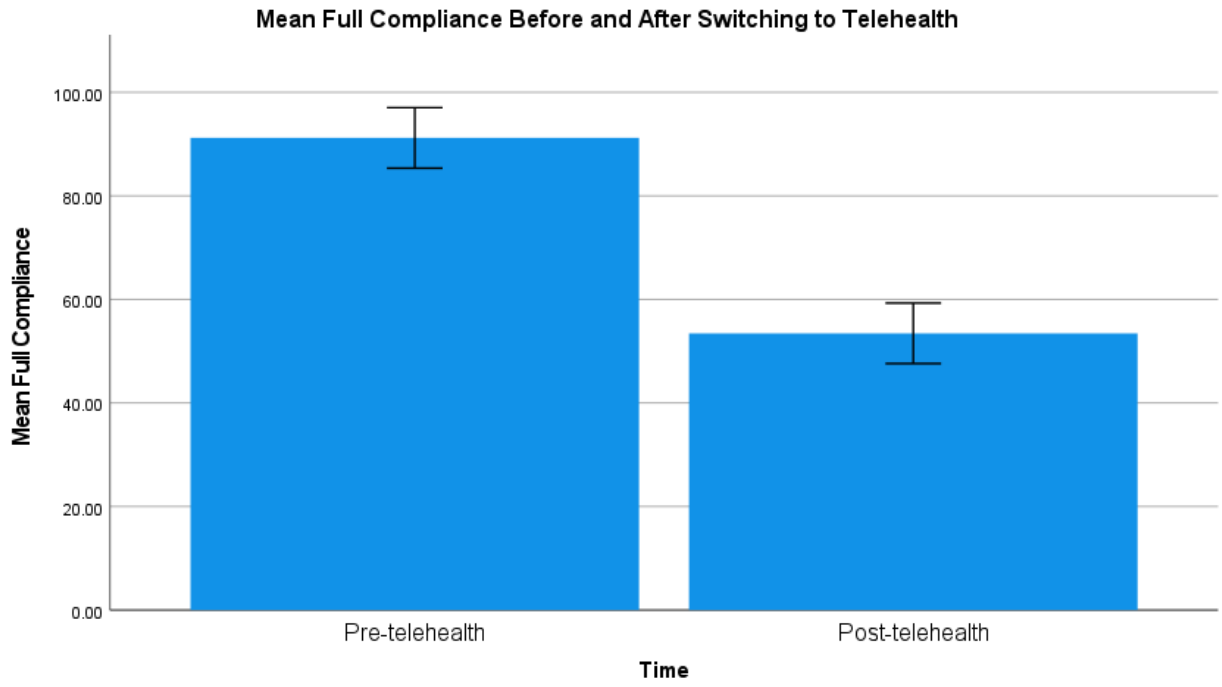

Figure 3 This table shows the mean full compliance for the hybrid modality at two different timepoints. In the pre-telehealth timepoint, patients were experiencing in-person services. In the post-telehealth timepoint, patients were experiencing telehealth services.

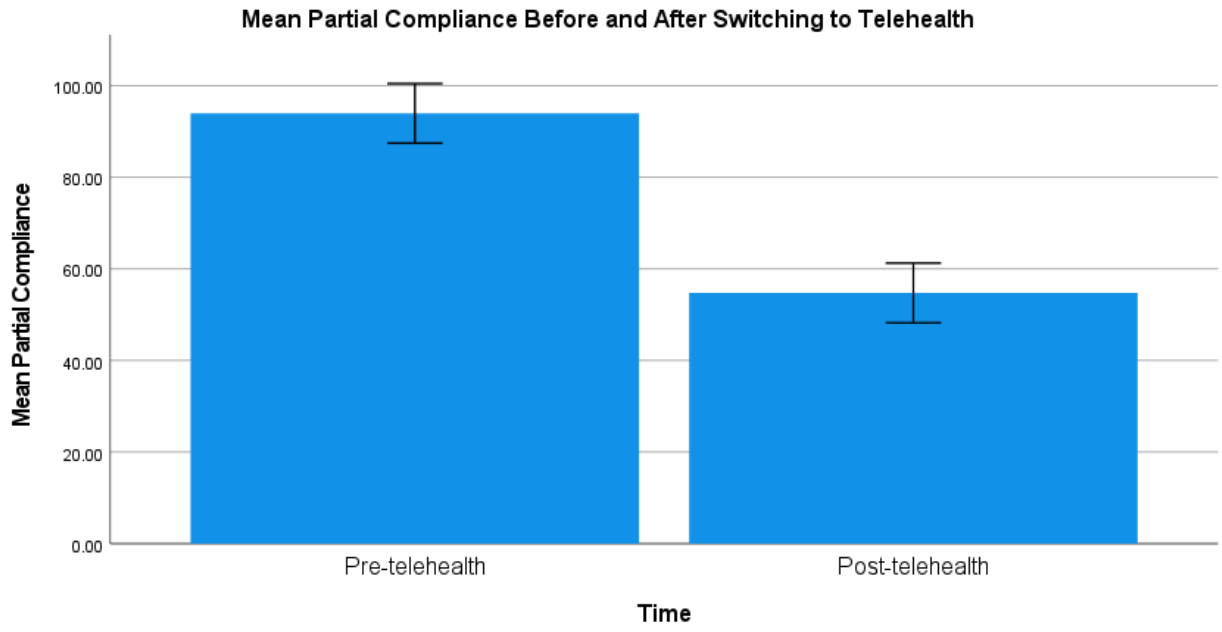

Figure 4 This table shows the mean partial compliance for the hybrid modality at two different timepoints. In the pre-telehealth timepoint, patients were experiencing in-person services. In the post-telehealth timepoint, patients were experiencing telehealth services.