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Optimization of Mental Health Appointment Mix: Telemental Health and In-person Appointment Model Maximizing Revenue and Mitigating No-shows

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A doctoral project submitted to the faculty of the Medical University of South Carolina
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Member, Project Committee	Daniel L. Brinton, PhD	Date
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Abstract of Dissertation Presented to the
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Mental Health care leaders are challenged with meeting revenue requirements while incorporating telemental health (TMH) to increase access. The objective of this project was to create a model to optimize revenue based on variables derived from the literature, notably no-shows, reimbursement, salary cost and appointment type. The model was tested through sensitivity analysis. The order of sensitivity to net revenue based on 10% variable increase was reimbursement rate (19% increase), appointment volume (10% increase), cost (8.5% decrease) and no-shows (1% decrease). 3 scenarios were run for large (10 providers), mid sized (4 providers) and single provider facilities. In person vs telemental health appointment mix for each scenario was set at 80%/20%, 50%/50%, 20%/80%. Reimbursement rate for TMH was set at 70%, 80%, 90% and 100% (parity) of in person recovery. Results showed 100% TMH reimbursement was only scenario increased TMH appointments increased revenue. 90% reimbursement had minimal revenue loss with increased TMH (2-3%) and 70% or 80% had significant losses (9%-30%). Parity is vital to TMH revenue impact and adoption.

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CHAPTER I INTRODUCTION

1.1 Background and Need

The complexities of providing healthcare have multiplied as modalities to care have expanded. Healthcare is no longer limited to brick and mortar facilities where patients come to see providers. The expansion of telehealth and virtual options for providing care, managing patient needs and delivering information continues to mature. The utilization of telehealth has exploded with the Coronavirus 2019 (COVID-19) pandemic. The global impact of COVID-19 on healthcare systems required restriction of in person visits and opened a necessity to provide care with minimal face to face contact. The history of telehealth traverses decades but COVID-19 has played a significant role in its evolution and integration into our healthcare system in a few years.

Mental health (MH) care has been a key service impacted by the accessibility and development of telehealth services. MH illnesses affect 45 million adults in the US, with 1 in 5 adults experiencing a mental health condition within a year (Zhao et al., 2021). The concern is even with such high demand there is a shortage of providers, most notably in rural communities, that provides challenges to many receiving necessary care. Primary care providers report MH care shortage at an alarming rate, 2/3 of providers in the United States, are unable to find the necessary MH care for their patients (Zhao et al., 2021; Laukner & Whitten, 2016). Patients can go untreated which has a significant effect on their quality of life, overall healthcare and can drive additional healthcare costs as symptoms of untreated MH conditions drive emergency room and other health professional visits. The challenges in providing MH care with high demand and low provider supply highlights the need to maximize the potential benefits of telemental health services. Telemental health (TMH) opens additional avenues for MH providers to treat patients removing limitations such as distance, travel cost and time.

The ability to provide care both in person and through telehealth capabilities has opened questions into comparative outcomes and quality of care comparisons. However, the comparisons of telemental health and in person MH care have not been studied extensively. Most studies have supported

telemental health being as effective, if not more, than in person MH care (Adams et al., 2018; Zhao et al., 2021). The questions surrounding telemental health efficacy are often driven by specific diseases being more or less appropriate for telemental health care. Overall, studies continue to bear out that telemental health services are as effective as being seen in person.

The key barriers for telemental health are logistical issues (ex. high speed internet, equipment, software and service contracts, etc.), lack of connection with provider (ex. loss of non-verbals, feeling distant with technology), provider perceptions (are providers proponents for telemental health, comfortable using technology), and policy (multi-state license, medication prescribing, liability, reimbursement). Many of these barriers can be addressed at the local facility level and working with the patient population. However, the policy issues are key drivers in the acceptance and utilization of telemental health. The challenges with licensing across state lines and most notably reimbursement have been key hinderances to more widespread adoption of telemental health pre-COVID.

The telemental health programs for many institutions struggle with financial sustainability (Fourtney et al., 2019). The reimbursement policy of Centers for Medicare and Medicaid Services (CMS) was very restrictive and often private payers followed CMS' lead. Medicare required specific provider types, facility types, and rural or MH shortage area designation in order to receive reimbursement. COVID-19 has seen most restrictions lifted and reimbursements more abundant but concerns of how the system re-aligns once the pandemic subsides and emergency waiver of requirements are removed is prevalent. Additionally, not all states and payers provide pay parity for telemental health services. Many states have passed telehealth parity laws but there is no national requirement for pay parity for telehealth services. This often leads to less reimbursement for telehealth and can drive decreased financial viability and lower desire by providers and organizations to utilize telehealth fully.

A key consideration for MH services is patient non-compliance with appointment attendance, otherwise termed no-shows. The no-show rate for patients can directly affect care outcomes, loss of provider time, decrease appointment availability and loss of revenue. The time required to follow up with

patients on why they missed the appointment and reschedule them can additionally take time and resources from organizations. The reasons for patient no-shows have been studied and many initiatives to mitigate no-shows are published, most are focused on increased and effective communication with patients. Additionally, containing multiple appointments to one day and providing varying and effective appointing processes have been shown to be effective (Rashid & Saraykar, 2021; Defife et al., 2010). MH services often generate high no-show rates for in person care, with studies showing no-shows as high as 60% (Milicevic et al., 2021). COVID-19 has allowed greater telehealth data and telemental health no-shows have been shown to be lower than in person appointments at 5.5-8.5% (Mishkind et al., 2021). The business side of care also poses the question of which option, face to face or telehealth, generates more revenue. Quality outcomes and efficacy are poignant and primary questions however cost and revenue are critical questions to consider thereafter.

MH services are affected by how the different modalities of care drive no-shows and revenue. The real-world application of these factors creates questions for facilities in determining what type of service to provide, face to face or telehealth, and when offering both services what is the ideal appointment mix? A review of the literature does not reveal any studies that focuses on this question and how facilities can optimize their appointment mix to maximize revenue and minimize no-show rates. The following study looks to build a model to incorporate service cost factors, no-show rates, and reimbursement rates and provide ideal appointment mix offering to patients.

1.2 Problem Statement

The institutions with telemental health capabilities are challenged by policy constraints, maximizing provider time, reimbursement challenges and patient no-shows. The leadership and care teams are charged with deciding the ideal appointment mix offering for their patients, between telehealth and in person appointments, to meet their population's demand, meet revenue requirements, and fully engage their clinical staff. The ability to effectively provide appointments that are used, maintain and/or maximize revenue, decrease or mitigate no-shows, and use provider time at the optimal level is the goal.

This study will develop a model to determine the optimal case mix of telemental health and face to face MH appointments to maximize revenue and provider productivity. The consideration of the differences between telehealth and in person care for reimbursement, no-show rates, provider salary, facility costs, and impacts to care will be included as model variables. The goal is to create a comprehensive model that can estimate the optimal appointment mix (telehealth vs in person appointments) as an output, based on individualized facility inputs.

1.3 Research Questions and Research Hypotheses

The primary research question is what are the main drivers of case mix optimization in MH? The secondary question is how does no-shows affect revenue? The creation of a model will provide relational comparison to how appointment mix affects no-shows and revenue. However, the secondary question would be what effect no-shows have on revenue. The research question has been well addressed in literature and no-shows have effectively been shown to decrease revenue.

1.4 Model Target Audience

The primary target audience for this model are the MH program administrators and their scheduling and clinical staff.

2 CHAPTER II SCOPING LITERATURE REVIEW

The following literature review was done to assess the current state of knowledge concerning telemental health and no-shows. The intent is to provide a background to the knowledge base on telemental health utilization, policies, reimbursement. Additionally, no-show studies were reviewed to show the impact of no-shows to healthcare. The literature review provided there is a knowledge gap in the study problem of providing a model showing the ideal appointment mix of telemental health and in person appointments with considerations specifically to reimbursement and no-shows. The literature reviews were conducted through Scopus, PubMed and ProQuest. The following provides the known literature at the time of this study and lays the foundation for the model in this study.

Telemental Health

Telemedicine is "the provision of clinical services to patients by physicians and practitioners from a distance via electronic communication" (Fourtney et al., 2021). The initiation of telemedicine started decades ago. The initial documented medical consultation by closed circuit television occurred in the 1950s (Adams et al., 2018). Van Leer Johnson was an early adopter of the new model of providing care remotely and performed group psychotherapy appointments via close circuit tv at the Nebraska Psychiatric Institute. The early utilization of telemedicine was often funded by grants and was much more novelty than being perceived as grounded medicine (Adams et al., 2018). The expansion of telemedicine has developed in step with technology. The connection to patients through telehealth has been utilized by 76% of hospitals in the U.S. (Hyder & Razzak, 2021). Often the barriers to adoption was large equipment and necessity of strong internet or communication service. The boom of the internet age allowed rapid development of this new technology and mode of providing care. The Veteran's Affairs (VA) have been long standing leaders in telemedicine for decades, providing up to 13% of veterans with some form of telehealth (Doran & Lawson, 2021). The research and studies into and concerning telehealth has shown overwhelmingly favorable sentiment (Doraiswamy & Momtami (2020).

Telemental health has been one of the leading telehealth services. Primary care and telemental

health have been found to be the most utilized telehealth services at 92% of total telehealth appointments (Evans, 2012). "Mental health care is a leading medical specialty in which providers use telemedicine to engage with their patients and deliver evidence-based treatments" (Burnell et al., 2021). The utilization of technology to provide care for MH services is an ideal fit as often MH care doesn't require a hands-on physical exam. The focus of the MH appointment is often the verbal (and no-verbal) communication between the provider and the patient. The shortage of MH providers and accessibility enhancements through technology provide a great pairing. The concerns and issues surrounding telehealth have been plentiful, however. The most pressing question for many initially was is the efficacy of telemental health lesser than in person MH care?

The literature on telemental health is heavily geared to answering the question of its efficacy in comparison to in person care. Overall, the literature has supported that telemental health is as effective as, if not superior to, in person care (Zhao et al., 2021; Mcdowell et al., 2021; Mehorota et al., 2017; Shigekawa et al., 2018; Adams et al., 2018; Doran & Lawson, 2021). The comparative studies have been varied in approach but have included randomized clinical trials and continued to bear out similar results showing comparative efficacy. Telemental health has also been found to be more favorable and effective to those who have to travel long distances or have difficulty accessing care physically (Mcdowell et al., 2021). The benefits of alleviating patients traveling extended periods which can affect work and family schedules, transportation costs and travel time have shown to benefit the patient and provide greater patient satisfaction and adherence to appointment schedules (Burnell et al., 2020). Additionally, its effectiveness has shown to be comparable across a wide range of demographic groups (Zhao et al., 2020). The efficacy of telemental health is a critical component to its future usage and potential expansion. The fact that it has repeatedly been found to be as effective as in person care provides a strong case to its greater usage.

The adoption and utilization patterns of telemental health are well studied. Pre-COVID there were significant barriers and challenges to telemental health, and it bore out by curbing adoption more

widely. MH facilities adopted telemental health as a modality for providing care at a low rate with only 25% offering telehealth services (Zhao et al., 2021). The use of telemental health has steadily increased in recent years growing by 50% annually (Mcdowell et al., 2021). The usage of telemental health increased across states with high broadband access, higher percentages of rural counties and special application process for multi-state licensure. Additionally, facilities with high technology capacity were more likely to implement telemental health (Zhao et al., 2021). The growth of telemental health pre-COVID was steady but was still slowed by a number of factors to include reimbursement policies, licensure requirements when treating across state lines, liability concerns, costs and provider buy in. The COVID-19 pandemic pushed CMS to remove restrictions for reimbursement and provide more good faith requirements for adherence to HIPAA and treatment. The pandemic allowed, and almost required, usage of telemental health services. The full impact of COVID-19 on permanent adoption of telemental health for many facilities is unknown as reimbursement policies, licensure and liability questions still loom post-COVID.

The utilization of telemental health is most effectively driven through primary care collaboration or referral treatment. In the collaborative model the MH care team remotely consults with the primary care team and does not provide care directly to the patient. In the referral treatment modality, the MH care provider works directly with the patient and provides care via telemedicine (Fourtney et al., 2021). The MH facilities that utilize telemental health are often using it as a supplemental service and not a standalone care modality. Providers and organizations often supplement in person care and provide extended care through telemental health. The modality provides an effective way to continue care and provide follow up appointments for many providers and patients. The hybrid model allows providers to have in person interaction initially and continue to provide treatment remotely thereafter. The utilization patterns show telemental health appointments are most often with patients who have an established care relationship with prescribing provider staff (McDowell et al., 2021). The use of telemental health is much less likely to be with support staff or non-prescribing providers and even less so with initial provider

appointments taking on a new patient. The modality is being advocated for by telehealth adopters and would be an effective way to utilize technology without completely removing in person care at the onset. The usage of telemental health with the same in person provider is also supported by greater usage when services are incorporated within one system. The familiarity and trust in the organization supports patient trust in using technology for care and strengthens adherence to appointments (Fourtney et al., 2019). Patients who are sent to a different organization for telemental health than the one that provides them in person care opens challenges to understanding a new health system, to include their appointing processes, paperwork and pre-visit requirements and comfort level of the patient due to lack of familiarity. The patient requires continuity not only in provider but organizational structure and processes to enable the most successful care outcomes. One of the biggest examples of continued care under the same organization would be the VA. In Fiscal Year 2019, more than 2/3 of the VA's 900,000 telemedicine appointments were for telemental health (Slabodkin, 2019). The VA's focus on MH and patients who understand the organization's appointing process and administrative requirements has made it one of the national leaders in telemental health. Health care facilities not only typically require remaining in their organization they rarely treat patients who are outside a health care facility. Facilities almost exclusively require telemental health treatment to occur in one of their facilities and rarely treated patients from home pre-COVID (Uscher-Pines, 2020). Telemental health is most often utilized for medication management and diagnostic assessment (Uscher-Pines et al., 2020). The usage of telemental health also alleviates the burden of stigma or concerns of shame from the patient in entering a MH facility (Birk, 2020). The power in receiving care and mitigating concerns of stigma from getting MH care are important factors to telemental health utilization.

A benefit often expressed concerning telemental health is its effectiveness in reaching rural communities. However, studies have shown conflicting utilization of telemental health in rural communities compared to urban areas. Higher utilization of telemental health in rural communities has been shown (Kyle et al., 2021), however more commonly greater usage is shown in urban areas or low

rural area utilization (Patel et al., 2020; Demeke et al; 2021; Mehrotra et al., 2017; Kyle et al., 2021). The challenges for rural communities has shown to be broadband internet access, MH provider shortages or lack of partnerships from external providers, and equipment and technology investment costs (Demeke et al., 2021; Kyle et al., 2021). Additionally, telemental health is often utilized as a supplemental service to in person care as observed broadly (McDowell et al., 2021; Mehrotra et al., 2017) and would still rely on supply of local community providers. The challenges for rural communities limit the ability of healthcare organizations to receive or provide telemental health as effectively as urban communities. Telemental health provides an opportunity to close the healthcare access disparities that exist between rural and urban communities. The challenges rural communities have experienced has not allowed telemental health services to fully mitigate the provider and care shortages they often face but it has bridged the gap in part (Patel et al., 2020). Telemental health appointments have risen over time in rural communities showing a 50% growth rate from 2004-2014 (Mehrotra et al., 2017) and the expansion due to COVID-19 will undoubtedly benefit rural areas' telemental health infrastructure going forward. The rural providers also have the challenge of managing their appointment capacity when offering telemental health. The provider's schedule and availability of in person appointments may be in higher demand in rural communities with less care options for patients. Providers and support staff will have to effectively manage telemental health capacity as a priority and absorb any pressure for in patient visits lost to telemedicine by the community (Lambert et al., 2016). Facilities who feel they have the capacity to provide all care in person will still need to put a focused effort in promoting and using telemental health. The impetus to utilize telemental health is significantly reduced when enough provider staff are available for in person care (Uscher-Pines, 2020), however the efficacy and growth potential of using telemental health and broadening beneficiaries offered care should be considered.

Cost savings has been a significant benefit for organizations and patients treated through telemental health. The organizations utilizing telemental health have seen savings of 40-70% (Deslich et al., 2013). The reduction of facility costs, supplies and increased volume of patients provides a cost per

visit savings across telemental health services. The savings are a significant driver for organizations as MH conditions have been found to be one of the costliest illness to treat (Zhao et al., 2020). However, other studies have found increases in MH costs specifically with implementing telemental health, but overall health care costs reduced per patient (Zhao et al., 2020; Shore et al., 2007). The additional healthcare related to an untreated MH condition may drive the overall healthcare cost saving. The utilization of consistent telemental health care can reduce emergency room visits, additional medications and urgent treatment if patients are untreated or not consistent with in person care. The cost savings to patients was realized in reducing transportation costs (Shore et al., 2007; Cowen et al., 2019). The patient not having to travel to where MH providers are located, which are limited in supply, allows for care to be provided at a local facility or even at home and removes much of the transportation costs patients incur. The VA found telemedicine allows patients to realize a 145 mile or 142 minute savings in transportation (Cowen et al., 2019).

The COVID-19 pandemic had a significant effect on the utilization of telemental health. The pandemic caused facilities to reduce, if not totally eliminate, in person care. The stay at home orders and isolation required by many state and public health experts caused a definitive need for telemental health. At the onset of COVID-19 only 43% of outpatient MH facilities had the infrastructure to provide telemental health (Cantor et al., 2021; Demeke et al., 2021). A concerning point was states without stay at home orders were providing more telemental health services compared to states with these types of shelter in place orders (Cantor et al., 2021). The pandemic may have exacerbated MH care shortfalls in these states as patients who needed care in very stressful times had less capacity to receive it through telemental health. The pandemic also highlighted key issues with telehealth utilization pre-COVID. High speed internet had a significant impact on telehealth usage as 53% of households with high speed internet reported using telehealth compared to 36% of households without high speed internet (Kyle et al., 2021). The pandemic saw rapid growth of telehealth and telemental health. Nearly all health centers reported using telemedicine (95%) after the pandemic hit, up from 43% (Demeke et al., 2021). Half of households

reported receiving telehealth because they could not access in person care (Kyle et al., 2020). The VA saw a 1,000% increase in video telehealth sessions after the pandemic hit (Doran & Lawson, 2021). The telemental health visits in the VA rose 556% during the pandemic (Connolly, 2021). The rapid and broad expansion of telemental health and telehealth as a whole due to COVID has provided a stronger infrastructure and overall patient and provider comfort using this technology.

Telemental health additionally opens the reach of providers and becomes a care multiplier allowing patients who were not able to travel to or find a provider to receive care. Telemental health also expands the MH workforce by allowing retired or part time MH providers to continue to provide care (Uscher-Pines et al., 2020). The counties without MH providers showed greater telemental health utilization (Evans, 2012). Thus, the lack of available care requires using telemental health. Those areas and facilities that do have enough providers to treat patients in person need to prioritize using telemental health to expand access beyond their current population to increase care and supply of appointments more broadly. The benefits to patients receiving care who would otherwise be left untreated is significant as it gives hope, care and confidence to these patients and provides a sense of freedom in knowing their illness and how to manage it (Deslich et al., 2013). Patients are often very satisfied with telemental health and the challenge is providers are not as satisfied (Doran & Lawson, 2021). The provider is the lynchpin in telemental health care access and acceptance. Providers decide 90% of patient's use of telemental health in psychiatry (Cowen et al., 2019). The enthusiasm of the providers and staff has a direct effect on the patient's acceptance of telemental health (Leigh, Cruz & Mallios, 2009). The provider's understanding and comfort level with the technology is often the deciding factor in the enthusiasm to effectively utilize telemental health. Providers who had received telemental health training and were more comfortable with the technology were much more likely to adopt telemental health (Bunnell et al., 2020). However, the most important factor in determining a provider's utilization of telemental health was their perception of its usefulness (Bunnell et al., 2020). Exposure to telemental health has been seen as a significant barrier for providers perception. However, COVID-19 provided an exponential amount of exposure for many

providers who may have not been closely interacting with this mode of care. Pre-COVID approximately half of providers had positive feelings toward telemental health and a third had negative feelings and after COVID the negative feelings decreased though were not fully removed (Doran & Lawson, 2021). Provider concerns were reduced with increased interaction with telemental health.

The utilization of telemental health is hampered by the obstacles providers often face with this mode of care. The more common issues and concerns providers have are reimbursement, regulatory issues, licensure challenges, and educational/training shortfalls (Cowan et al., 2019). The perception of the provider and what issues and obstacles they will have to overcome drives their desire to even offer it to their patients. Limiting or removing these barriers could have significant positive effects on greater adoption of telemental health. Provider concerns include privacy and security, safety (for patients who may do self-harm), location of care (home or healthcare facility), and stability of network connection (Cowen et al., 2019). These issues are driven often when less or no interaction with the system and no clear plan or guidelines established. Healthcare facilities and providers can ensure quality and safe telemental health services and support provider concerns by enacting clear policies on how and where appointments are held. A concern from providers is being unable to build rapport via video or technology (Cowen et al., 2019). However, it has been shown that patients typically do not have an issue with technology in building a rapport with their provider and for some patients the remote set up may make it more comfortable for them to be open and candid about tough to discuss topics during therapy with technology providing some sense of security (Cowen et al., 2019). Mitigating the concerns of providers and providing greater exposure to telemental health can have significant effects in growing its adoption and usage. Implementing telemedicine and telemental health training in medical schools and residency programs can go a long way in providing new physicians exposure to telemedicine.

The removal of barriers to telemental health from a policy perspective would be significant to wider adoption as well. Critical policy issues surrounding telemental health are reimbursement, licensure and liability. Telemental health adoption from state to state has been broadly driven by policy differences

(Zhao et al., 2021; Delisch et al., 2013). Providers are often hindered from proving care outside of their state due to licensure laws. Providers must have a license in the state they are in and the state the patient is receiving care (Delisch et al., 2013). The process to obtain a license in a different state has not been eased when a provider already has a license in one state. Some states have opened conditional or telemedicine licensure for those who are already licensed in another state however this process is not provided nationally. State laws vary on execution of telemental health appointments as well with some states requiring the provider to have an office within the state (Cowen et al., 2019). MH facilities in states that provided interstate licensure processes had greater telemental health adoption than those that did not have such licensure rules in place (Zhao et al., 2021). The policies on credentialing and licensing at each individual facility can be a limiting factor as well. Often the facility providing or receiving care will require credentialing and privileging of the telemental health provider which can be costly (Fourtney et al., 2019). The processes for telemental health providers to practice across state lines and with different facilities has been a challenging factor and has limited telemental health more broadly.

The Health Insurance Portability and Accountability Act (HIPAA) laws require secure and confidential connection with the patient during telemental health appointments. This requires encryption or specialized secure connection to ensure HIPAA is maintained during the appointment and patient encounters or information is not intercepted. One of the many reasons for telemental health's expansion during COVID is the Department of Health and Human Services (DHHS) has loosened its enforcement of HIPAA on telehealth communications as long as the provider is showing good faith (Cantor et al., 2021). The easing of restrictions has allowed more broad adoption of telehealth with less concerns on purchasing specialized equipment or software to meet the HIPAA requirements. CMS also lifted the licensure restrictions and allowed providers who meet certain criteria to be reimbursed for care in other states in which they are unlicensed (Cantor et al., 2021). These policies adjustments were driven due to the emergent pandemic however many are concerned with how these policies will restrict telehealth if put back in place post-COVID.

The reimbursement of telehealth is a critical barrier for many providers. The policies and restrictions to reimbursements can cause many telemental health programs falter (Lambert et al., 2016; Fourtney et al., 2019; Hyder & Razzak, 2021). CMS has restricted reimbursement and provided restrictive criteria in providing payment from requiring patients to live in health professional shortage area or county outside a metropolitan area and encounter performed at an eligible site with an eligible provider present (Lambert et al., 2016; Deslich et al., 2013; Adams et al., 2013). States and payers have also initiated restrictive payment policies to include requiring patients complete a telemedicine consent form, requiring an initial visit in person with the provider, limitations to the provider type, setting, and geographic area (Fourtney et al., 2021). The concern from many providers also extends to the level of reimbursement being enough to cover cost of providing the service, equitable reimbursement across payers and states, and challenges with uninsured or underinsured patients (Lambert et al., 2016; Adams et al., 2018). The limitations in reimbursement also stem to the type of service offered. CMS has restrictions on the type of services that are reimbursable, and providers can be left without reimbursement at all if providing uncovered telemental healthcare (Brooks & Augustfer, 2013). Additionally, a critical point for many is parity in pay. All payers do not reimburse at equitable rates for in person care compared to telehealth. Many states have passed health parity laws requiring payers to reimburse telemedicine at equitable rates as in person visits (Mehrotra et al., 2017). However, there is no national mandate to ensure effective and equitable reimbursement for telemedicine visits. The result is a provider or healthcare organization, especially smaller scale organizations, assume additional risk in providing telemental health with limited and challenging reimbursement policies and recoupment (Lamber et al., 2016). The additional risk can be too much for providers or organizations to take and will limit the adoption of telemental health. A 2019 survey showed that 38% of healthcare payers and providers did not include telehealth in their strategic plans due primarily to reimbursement and policy challenges (Chen et al., 2020). Medicaid across multiple states have expanded the types of services it will reimburse for in 2018 (Hyder & Razzak, 2021). Ultimately it is these challenging policies and limitations to reimbursement that causes less than 20% of

telemental health providers to bill insurance for their services (Bunnell, 2020; Cowen et al., 2019). COVID-19 allowed CMS to remove many of these restrictions, including geographic location requirements, some of the licensure challenges, and provider type limitations, and reimburse at a much more consistent rate as telehealth expanded (Hyder & Razzak, 2021). The concern for many is how will reimbursement shift when the pandemic is over. Lifting these restrictions has provided a modality for many providers and organizations to receive reimbursement but to enact all of the same restrictions that existed pre-COVID could drive a significant reduction in telehealth usage. The government policies and payment systems often lead private sector actions, so if the government changed their policies it's likely that private payers would follow suit (Hyder & Razzak, 2021; Deslich et al., 2013). However, there are states and payers already pulling back the exemptions to restrictions to telehealth. State regulators have begun pulling back or stating they will pull back exemptions allowing telehealth providers to treat across state lines and payers are pulling back reimbursement for telehealth (Kyle et al., 2021). The future of telehealth and telemental health is significantly tied to policy changes and most notably reimbursement policies that are equitable to in person care.

A critical concern of telehealth and telemental health overall is the safety and quality of care. The efficacy of this mode of care has been well documented however many providers and patients have concerns with additional safety issues that arise from virtual care (Cowen et al., 2019). Patients who are in distress or may cause self-harm are incapable of being abated when care is done virtually. The necessity of knowing where the patient is when receiving care, especially if not in a healthcare facility is critical to safe care. The distance in telemental health also requires the provider to have a clear understanding of the resources available in the patient's local area (Cowen et al., 2019). The lack of understanding what resources and community services are near the patient can cause the provider to be uneasy as they will not be able to effectively refer patients who need additional support. Additionally, quality is paramount when providing virtual care and ensuring care is up to standards is a necessity to match in person care (Hyder & Razzak, 2021). The quality of care provided by a provider or facility can

vary and thus it is imperative that quality telemental health care is supported and reimbursed and mitigate reimbursing simply because there is a high volume of care (Mehrotra et al., 2017). A study found that some telemedicine providers did not verify patient identity or authenticate and confirm information sent electronically was accurate and valid for the patient being treated (Hyder & Razzak, 2021).

No-shows

The impact of no-shows on healthcare is a significant barrier to effective care, drives costs, and wastes valuable resources such as provider time. No-shows are missed scheduled appointments with a provider. These appointments are often lost to anyone else's use and do not provide the intended care to the patient who did not show for the appointment. No-show rates have been documented as being 23% for all medical specialties, from 10% for primary care clinics to over 60% for MH appointments (Milicevic et al., 2020). Telepsychiatry appointments has been shown more likely to be kept and less likely to be no-showed or cancelled than in person appointments (Leigh, Cruz, & Mallios, 2009). The VA has estimated total no-shows across specialties to be at 18% (Milicevic et al., 2020). The broad range of no-show rates and consistently higher rates for MH has been identified through the literature. Studies have shown that telemental health appointments do provide lower no-show rates than in person MH appointments (Adams et al., 2018). Two outpatient MH clinics measured and found the no-show rate after COVID due to increased and almost exclusive telemental health utilization was 5.5 - 8.5%, with pre-COVID no-show rates of 12% (Mishkind et al., 2021). The increased availability of telehealth during COVID-19, to an almost exclusive mode of care for many patients, showed a 20% decrease in no-shows (Demeke et al., 2021). There are studies that have shown increased no-shows for telemental health compared to face to face appointments. The trends and rates of no-shows highlights the variability of no-shows and how telehealth, especially during the COVID-19 pandemic, has shown it reduces no-shows at a significant rate. In seeing the issue, now the consideration is how does no-shows impact care more definitively.

One of the significant impacts to care due to no-shows is increased costs. No-shows increase the

need providers and organizations have to generate more income as revenue is lost when patients do not show. The appointments are not able to be used by another patient and the provider salary for that time, including all support staff and facility expenses are lost without recoupment. Additionally, the increased costs incurred are driven by lack of managed illness of the patient who did not show. The no-show patient will need follow up since the scheduled appointment was missed and results in additional staff time and resources to make contact (Rashid, Rickman, & Saraykar, 2021). The increased costs can affect other patients as organizations may increase rates to make up the difference in lost revenue from no-shows (Defife et al., 2010; Demeke et al., 2021). The VA calculated the costs associated with no-show appointments and found an annual cost of $564 million and $196 per missed appointment to be the direct fiscal effect no-shows had to the organization (Milicevic et al., 2020). The increased costs associated with no-shows provides reasoning to determine the reason for no-shows.

The factors that drive patients to no-show is significant, as mitigation actions can be driven based on the data. One of the variables that most significantly predicted patient no-show behavior was prior appointment activity, most notably if the patient had no-showed previously (Demeke et al., 2021; Milicevic et al., 2020). The models predicting patient no-shows provided the greatest correlation with prior patient no-show activity. The scheduling at the facility was a significant factor to no-shows. Inconvenient scheduling practices drove more likelihood of generating no-shows especially if patients had to travel long distances (Rashid, Rickman, & Saraykar, 2021; Evans, 2012). The types of inconvenient scheduling systems were those that were difficult to access or understand or did not make re-scheduling or cancelling easy. Finances and transportation were additional reasons for no-shows. Patients who had to travel longer distances, issues with losing hours or missing work, and those who did not have insurance and would have to pay were causes of no-shows (Defife et al., 2010). Forgetfulness was also a cause, especially when scheduling was farther out into the future (Demeke et al., 2021; Defife et al., 2010). The patients who had challenges to access to care were more likely to no-show. The types of patients with access challenges included patients who were younger, minorities, poorly insured, lived far from

healthcare resources, less educated and lower socioeconomic standing (Defife et al., 2010). The reasons behind patient no-shows has provided studies into actions to mitigate noncompliance with appointments.

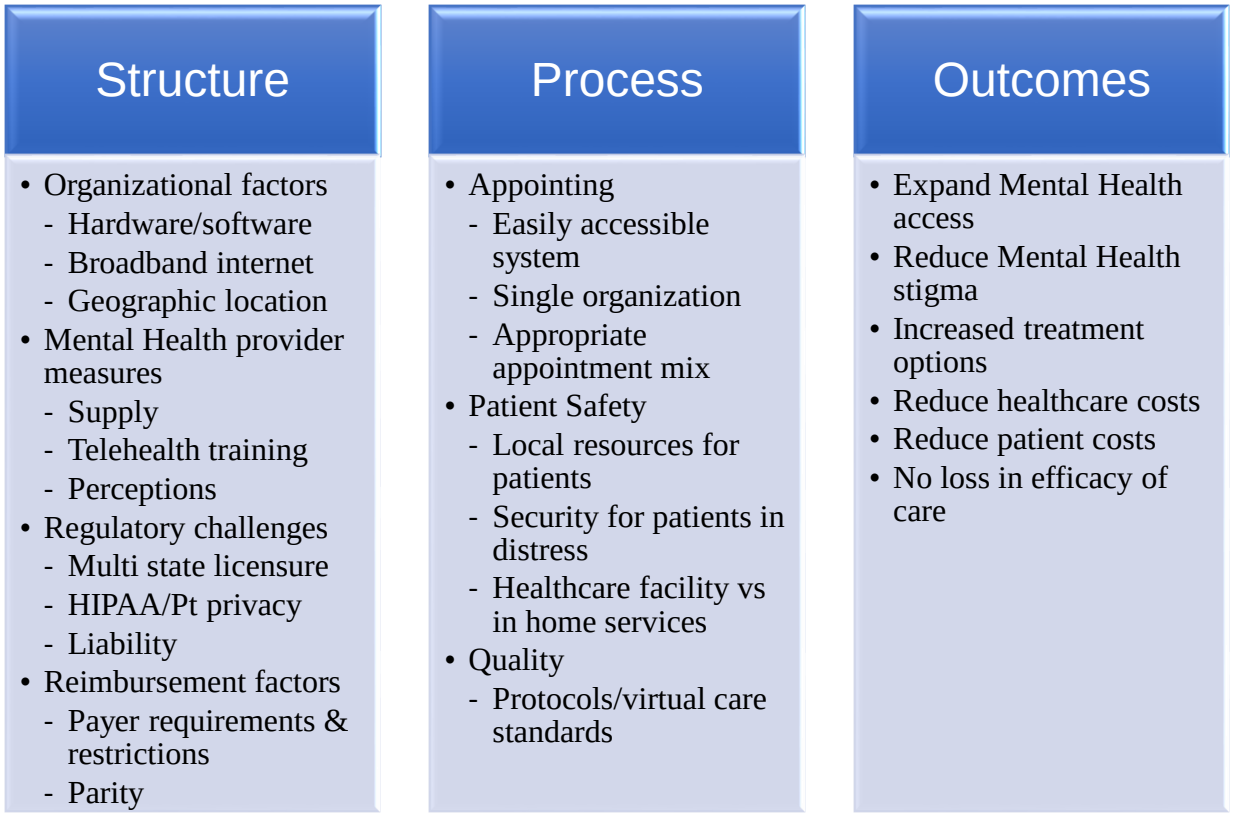
The primary method used to correct patient no-shows is communication. Providers and organizations utilize reminder systems to communicate with patients in the day or hours prior to an appointment (Demeke et al., 2021; Evans, 2012). Reminder calls has shown a 10% reduction in missed appointments (Evans, 2012). Scheduling was a key factor to mitigate no-shows. The facilities that ensured multiple appointments were scheduled on the same day saw fewer no-shows occur from these patients (Rashid, Rickman, & Saraykar, 2021). Marketing has been a tool to communicate the importance of kept appointments and not being a no-show (Demeke et al., 2021). The patient's responsibility and cost information can be deterrents in patients who may miss an appointment if marketed to appropriately. Fees and fiscal penalties are also key deterrents used to mitigate no-shows (Demeke et al., 2021). Charging patients, a fee for not appropriately rescheduling appointments and just not showing is meant to incentivize reduced no-shows and better appointment adherence.

Conceptual Model

The desired outcomes and multivariable structural and process challenges involved within maximizing telehealth adoption and usage and appropriate in person appointment mix can be visualized through a Donabedian model. The following model outlines the various and complex structural components institutions will have to address. The organizational factors include implementation costs for telehealth hardware and software, broadband internet, and geographic location which may drive greater need for telehealth (rural communities with fewer MH options). The provider structural factors include the supply of MH providers, and the training, comfort and ultimately perception of providers toward telemental health. The regulatory and reimbursement factors are inheirent in the healthcare overall structure and external to the organization but are critical to the adoption and utilization of telemental health. The process factors of appointing, patient safety and quality in the execution of telemental health care are critical. Maximizing telemental health and in person care requires optimizing appointing mix,

easy to use appointment systems and care being provided within one organization so pateints are familiar with the policies and procedures. The patient safety factors ensure detrimental events that can arise are planned for such as patients in distress, distant providers know resources available for the patient locally, and the location of the patient is well planned and thought out when receiving care (in home vs in healthcare facility). The utilization of protocols and ensuring quality care is provided will drive better outcomes. The outcomes from appropriate telehealth care includes expanding the reach of MH care, reducing the stigma patients may feel having to got to a MH facility and increases the options providers and patients have for care. Additionally, telemental health reduces healthcare costs overall and costs to patients. The critical question most often asked has also proven that telemental health has an efficacy as, if not better, than in person care.

Figure 1: Conceptual Model



MH disorders affect approximately 20% of adults and 50% of youth in the U.S. while fewer than half will receive the care they need (Bunnell et al., 2021). MH providers are in demand and short supply. Telemental health has been shown to be as effective as in person care, provide cost savings and multiply the care reach providers have. COVID-19 has caused a surge in telemental health usage. However, policies on licensure and reimbursement are critical barriers to the future as COVID-19 exemptions are lifted. No-shows also drive greater demand for services as they limit appointment supply. No-shows raise costs, decrease provider productivity and are often mitigated with communication tools. The literature does not provide a clear study on how to effectively maximize revenue and minimize no-shows with telehealth and in person appointment mix.

3 CHAPTER III METHODOLOGY

3.1 Study Objective

Access to MH services is limited in many regions, affecting patients' health and increasing cost of care. Telemental health provides an opportunity for improving access to care, streamlining MH program services and reducing waste of staff time associated with no-show appointments. However, identifying the optimal use of telehealth is likely too MH program specific and too depend on program size, case mix, staffing pattern, and patient characteristics. The objective of the project is to develop a practical estimation model capable of examining the expected effects and costs associated with different mix of in-person and telehealth service provision. This model is targeted for use by MH program administrators, scheduling personnel and providers. Its role is to provide financial and service delivery estimates to examine different combinations of service mix. The results will be useful for process improvement efforts within MH programs.

3.2 Approach

We will use the factors identified in the conceptual model described in Chapter II (Fig 1) to develop an estimation model programmed in Excel. The model's structure will be approved by consensus agreement of the project committee, relying on the members expertise and understanding of process of care documentation. Model content will be derived from the literature and validated by sensitivity analysis.

3.3 Data Collection

The literature review for this project has identified the many factors that may affect the process of care and outcomes for MH service delivery programs that use a mix of in-person and telehealth service delivery modes. These factors are shown in Figure 1. We will use the studies and othe souces identified in the literarure review to develop an Evidence Table that summarizes the potential model parameters, their ranges, the quality of the souce study and the reference. These data will then be used to select the primary factors for inclusion and the initial model parameters. Missing elements will be stated as assumptions

about reasonable mean values and ranges and be based on consensus agererement by the committee. In cases where consensus can not be reached the primary author's choice will prevail.

3.4 Model Building

The model will be structured as a simulation model. It will be a simplication of a real treatment process and informed by the primary authors professional experience in the field. The model will be organized with inputs for mental health service managers related to their organization, such as no-show rate and provider schedules with appointments arranged by type of care modality (in-person vs telehealth). Cost of providing care will be estimated for the organization's providers during scheduled appointments and will key production factors (e.g. visits completed, unused visit slots wasted).

3.5 Model Validation

We will examine the model structure for appropriate simplification. This is an optimization process which will require iteration until there is committee consensus that the structure used is inclusive of all major process factors and that cost drivers are captured in sufficient detail to have face validity with the target audience. The effects of the model input parameters will be examined using sensitivity analysis. We will perform a one-way sentivity analysis to test effects of minimum and maximum value for all parameters and report the results in a Tornado Diagram. Multiway sensitivity analysis will be performed to identify minimum and maximum ranges for the output estimates and to assure that all cell programming is appropriately linked.

3.6 Reporting Model Results

The results of this study will be reported as Scenario Analyses. We will report on a Base Model which will be selected to represent an urban community based outpatient MH program based on the experice of the primary author. Two other Scenarios will be developed as follows: 1) a small rural program; 2) A mid-sized MH program. Each Scenario will provide estimates for an in-person to telehealth case mix of 80%/20%, 50%/50% and 20%/80%. Additionally each scenario and appointment case mix will compare parity vs non-parity outcomes with telehealth reimbursement at 70-90%.

3.7 Study Product Dissemination

A copy of the Evidence Table, a description of the model assumptions, and a physical copy of the Excel model will produce as part of this project. These products will be available for dissemination by request to the primary author.

4 CHAPTER IV RESULTS

4.1 Evidence Table

The evidence table is data derived from previous research that supported the model estimates and parameters. The critical aspects that drove the model included no-show rates, staff salary, state parity & interstate licensure compact inclusion, and reimbursement rates. The telehealth variables showing usage rates, volume of patients and payer mix helped shape the model and facility mix the model was based on. The no-show rates had variability with in person no-show rates of 8-13% and one study having 60%. The model used 15% as the baseline no-show rate to account for possible increased in person rate. The telemental health no-show rates showed 4-7% rates in the research. The model was built with 5% as the baseline telemental health no-show rate. The salary of mental health staffing was derived to create the costs variables, with the median rate for staff type from the Bureau of Labor and Statistics or Salary.com. States who have payment parity laws enacted as of March 2022 were listed and used in the model. Many states had laws that were in response to the COVID-19 pandemic and/or temporary. The states with temporary parity status were noted with an asteric in the model. The interstate licensure pact also allows model users to understand scope of practice they can actualize as potential cross state opportunities may more easily be available in participating states. The states that are not included do not have a path for easier licensure across state lines and can restrict possible telehealth service opportunities outside the state the facility or provider resides. Finally reimbursement data were derived from 2019 and 2020 for the 2 common CPT codes. The CPT code data were used to create reimbursement hourly rates for providers in the model. The model rates used the median rate for Psychologists, NPs, PAs, and nurses. One standard deviation above was for Psychiatrists only and one standard deviation below was used for counselors, peer specialists and technicians.

Table 1: Evidence Table

Reference	Variable	Value(s)	Notes
Zhao et al., (2021)	Daily volume of patients at MH facility	1-100 (45%); 100-250 (36.5%); 250-500 (11%); 500-1000 (3.3%); >1000 (3.8%)	U.S. survey for MH facilities identifying # of patients being seen daily
IMLC, (3/4/21)	Interstate Licensure Compact	States Participating: Alabama; Arizona; Colorado; Delaware; D.C.*; Georgia; Guam; Idaho; Illinois; Iowa; Kansas; Kentucky; Louisiana; Maine; Maryland; Michigan; Minnesota; Mississippi; Montana; Nebraska; Nevada; New Hampshire; New Jersey*; North Dakota; Ohio*; Oklahoma; Pensylvania*; South Dakota; Tennessee; Texas; Utah; Vermont; Washington; West Virginia; Wisconsin; Wyoming	Interstate Medical Licensure Compact allows out of state medical providers expedited process to obtain new state medical license to support telehealth *Legislation passed, but implementation has been delayed
Defife et al., (2010)	Kept Appts	85%	Appts Patient was seen
Defife et al., (2010)	No-shows	13%	Appts cancelled in less than 24 hrs
Milicevec et al., (2020)	No-shows	60%	
Mishkind et al., (2020)	No-shows	11.90%	
Mishkind et al., (2020)	No-shows w/TMH	6.80%	
Leigh et al., (2009)	No-shows, kept, & Pt cancelled appts in person	No-show: 7.8%; Kept: 87.4% Pt cancelled: 4.8%	% no-shows MH care (no TMH)

Leigh et al., (2009)	No-shows, Kept, & Pt cancelled appts w/TMH	No-show: 4.2% Kept appts: 92.3% Pt Cancelled: 3.5%	% telepsychiatry appointment no-shows
Zhao et al., (2021)	Payer Mix	Medicaid (88.5%); Medicare (68.3%); Private Insurance (80.0%)	U.S. Survey for MH facilities identifying payer mix accepted (Medicare, Medicaid or Private Insurance)
Mercatus.org, (3/5/22)	Payment Parity Law	Arkansas; California; Colorado; Connecticut*; Delaware; Georgia; Hawaii; Illinois*; Iowa; Kentucky; Louisiana; Maryland; Massachusetts; Minnesota; Mississippi; Nevada*; New Hampshire; New Jersey; New Mexico; Rhode Island; Tennessee; Vermont; Washington	States with Payment Parity Laws in place ensuring providers are reimbursed at equitable rates for telemedicine compared to in person care *Laws have expiration date in the next 5 years or only enacted for the Public Health Emergency (COVID-19)
Patel et al., (2020)	Rural MH appts	1.43 visits (in person) .06 visits (TMH) 1.49 Total	# appts annually for MH visits in rural areas
Mehrota et al., (2017)	Rural TMH appts	5.3 per 100 (any MH condition) 11 per 100 (serious MH conditions)	# annual appts per 100 benes
BLS.gov, (3/8/21)	Salary: Counselor	51,550 annually 24.78 hr	Median Salary
BLS.gov, (3/8/21)	Salary: Medical Admin/Front office	39,000 annually; 18.75 hr	Median Salary
BLS.gov, (3/8/21)	Salary: Mental Health Techs	35751 annually 20.19 hr	Median Salary
BLS.gov, (3/8/21)	Salary: Nurse	80,000 annually; 38.47 hr	Median Salary
BLS.gov, (3/8/21)	Salary: NP	114,512 annually; 55.05 hr	Median Salary

BLS.gov, (3/8/21)	Salary: PA	115,390 annually; 55.48 hr	Median Salary
BLS.gov, (3/8/21)	Salary: Psychiatrist	217,100 annually; 104.38 hrly	Median Salary
BLS.gov, (3/8/21)	Salary: Psychologist	100,130 annually 48.14/hr	Median Salary
Salary.com, (3/7/21)	Salary: Certified Peer Specialist	36,248 17.43/hr (calculated)	Median Salary
Mehrota et al., (2017)	TMH Provider location	93.50%	% Providers in the same state as patient
Mehrota et al., (2017)	TMH Provider Type	65.3% Psychiatrist 19.9% Nurse Practitioner 8.8% Psychologist	% providers seeing TMH appts
Uscher-Pines et al., (2021)	Type of TMH services offered	100% Telepsychiatry (diagnostic & med prescribing); 50% teletherapy; 30% Substance abuse	Survey 20 facilities on types of TMH services offered
Patel et al., (2020)	Urban MH appts	2.61 visits (in person) .01 visits (TMH) 2.62 Total	# appts annually for MH visits in Urban areas
	60 Min Psychotherapy Reimbursement (In Person) (CPT 90837)	2020-Median: $109.60; SD: $42.93 2019-Median: $110.86; SD: $50.64	Reimbursement received for 60 min Psychotherapy. Source 2019 & 2020 CEDAR Core data. Mean paid bill for privately insured patients
	60 min Family Psychotherapy w/Patient (In Person) (CPT 90847)	2020-Median: $108.56; SD: $55.56 2019-Median: $110.18; SD: $61.95	Reimbursement received for 60 min Family Psychotherapy w/Patient Source 2019 & 2020 CEDAR Core data. Mean paid bill for privately insured patients

4.2 Model Structure

The Mental Health Appointment Mix Model compares in person versus telehealth appointment costs and revenue for staff who see patients. The model has 5 tabs: Evidence table, Inputs & outputs,

Costs, Reimbursements, and Reference. The Evidence Table tab outlines the data points pulled from the literature for the model and scenarios for the project. The inputs and outputs tab is 3 parts; Assumptions at the top outlining the assumptions used for the project and model, Inputs allowing users to input state, facility no-show rates (both in person and telehealth), walk-in and/or waitlist rate, telehealth reimbursement rate compared to in person appointments, and an up to 10 member team composition with links to input a weekly schedule. The outputs show payment parity and interstate licensure compact status based on the state selected in the inputs. In person, Telehealth and Total columns detail the monthly (4 week) summation of Total costs (kept appts + Walk-ins), No-show costs, Lost revenue due to no-shows, Total revenue (Kept appts + walk ins) and Net Revenue (Total Revenue – Total Costs). The # of appointments, no-shows and no-show costs are pulled from the costs tab and lost revenue due to no-shows and total revenue is pulled from the reimbursement tab. The model shows staffing salary costs compared to revenue for appointment times only and highlights when telehealth reimbursement and in person reimbursement equates or differs how no-show differences can affect optimal mix of appointment types (telehealth vs in person). The cost tab has a weeks schedule for each staff type. Staff selections from the input tab would show at the top and those using the tool would input schedules on the cost tab only. Appointment duration in hours in relation to appointment time is inputted (ex. An hour appointment at 0800 would reflect a 1 in the 0800 row). Each staff member has an in person and telehealth column to allow varying types of appointment types for each staff member. In person and telehealth no-show rates as well as walk in rates are pulled from the Inputs & outputs tab. Costs are driven from staff hourly salary rate. The reimbursement tab provides a similar set up as the cost tab. The schedule from the cost tab is equated into the reimbursement tab and does not require re-entry. The average hourly reimbursement rate for staff replaces the hourly salary of the staff. Average hourly reimbursement is derived from reimbursement data for 2020 & 2019. These data were suppled by Dr. Simpson and were based on mean values for >2,000 outpatient billing records extracted for the CPT codes of interest from data licensed to the use of faculty in the MUSC Comparative Effectiveness Data

Analytics Core (CEDAR). The median and standard deviation for the 2 most common mental health CPT codes for an hour were 90837 (60 mins of Psychotherapy) and 90847 (60 mins Family Psychotherapy with Patient). The average value for the 2 CPT codes was used to derive the average reimbursement rate for Psychologists, Nurse Practitioners, Physician Assistants and Nurses. The average of one standard deviation above the mean was used as the Psychiatrist average reimbursement. The average of one standard deviation under the mean was used as the reimbursement rate for Counselors, Peers Specialists, and Technicians. The telehealth reimbursement rate will reduce the reimbursement in comparison to the in person rate based on what is inputted in the Inputs & Outputs tab. If the Payment Parity answer is yes then 1 is used instead of the percentage entered automating payment parity based on the state parity laws. Finally, the reference tab shows key reference numbers for the model to pull from in calculations. The information is reflected in the evidence table and assumptions sections of the model.

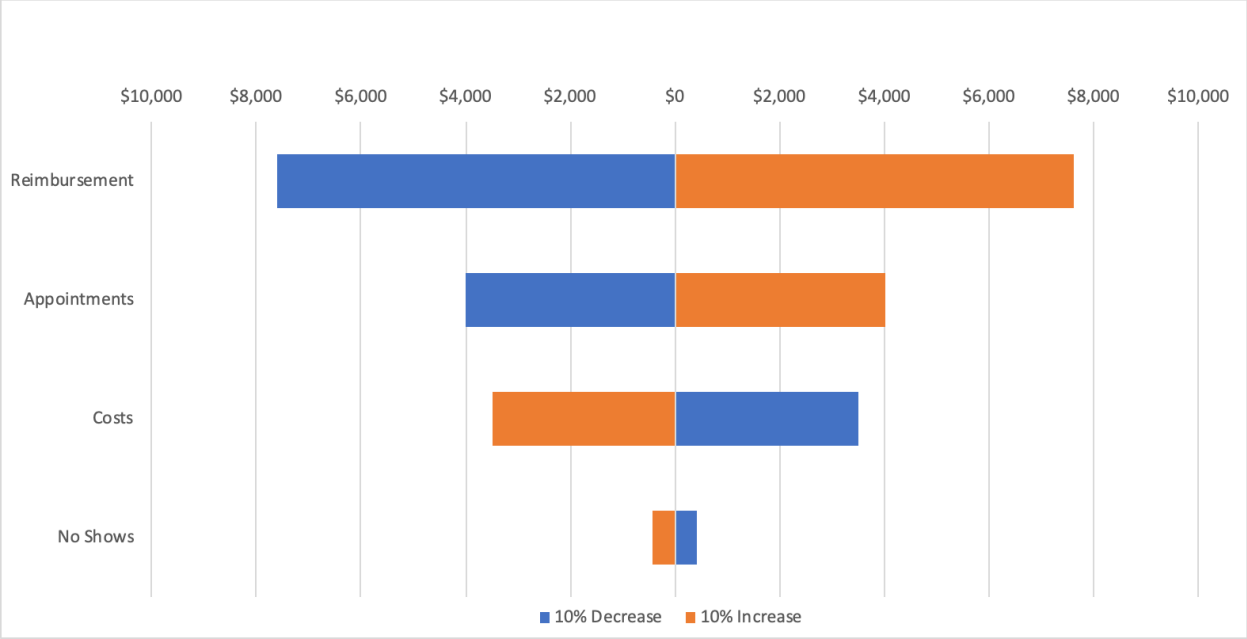
4.3 Model Parameter Validation

The model was assessed through sensitivity analysis. The primary items driving the model are number of appointments, provider salary costs, reimbursements, and no-show rates. These four variables were individually and independentaly increased and decreased by 10% to assess the impact to the model's outputs of costs, revenue and net revenue (reimbursement – costs). The sensitivity analysis data is provided in Table 2 showing the base model data and changes to outputs based on 10% increases or decreases to variables independently. A tornado diagram was created for each primary output (cost, reimbursement, and net revenue) shown in figures 1-3.

Table 2: Sensitivity Analysis: Changes in output (delta) from base model

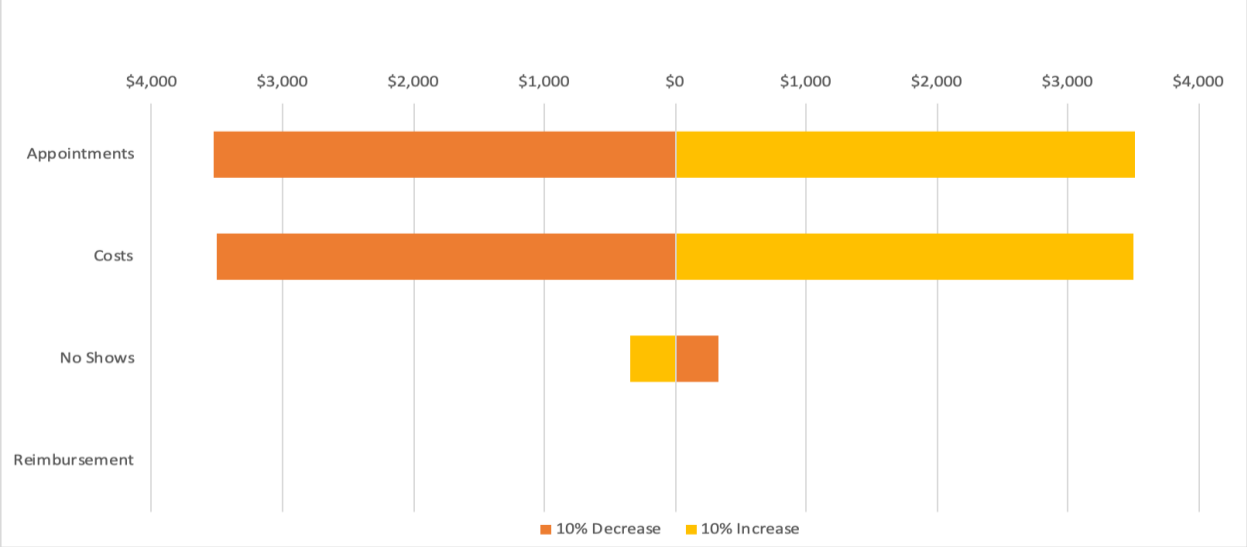
	Base	10% Appt Increase	10% Appt Decrease	10% Cost increase	10% Cost Decrease	10% Reimbursement Increase	10% Reimbursement Decrease	10% no show increase	10% No Show Decrease
Total Costs	$35,024.11	$ 3,512.46	$ (3,526.50)	$ 3,502.41	$(3,502.41)	$ -	$ -	$ (343.65)	$ 335.41
No Show Costs	$ 4,049.14	$ 411.34	$ (404.91)	$ 404.91	$ (404.92)	$ -	$ -	$ 326.82	$ (318.15)
Lost Revenue Due to No Shows	$ 9,184.77	$ 933.06	$ (918.48)	$ -	$ -	$ 918.48	$ (918.48)	$ 741.34	$ (721.66)
Total Revenue	$76,096.78	$ 7,536.21	$ (7,532.77)	$ 0.00	$ 0.00	$ 7,609.68	$ (7,609.68)	$ (769.88)	$ 752.69
Net Revenue	$41,072.66	$ 4,023.76	$ (4,006.27)	$ (3,502.41)	$ 3,502.42	$ 7,609.68	$ (7,609.68)	$ (426.22)	$ 417.28

Figure 2: Tornado Diagram - Net Revenue



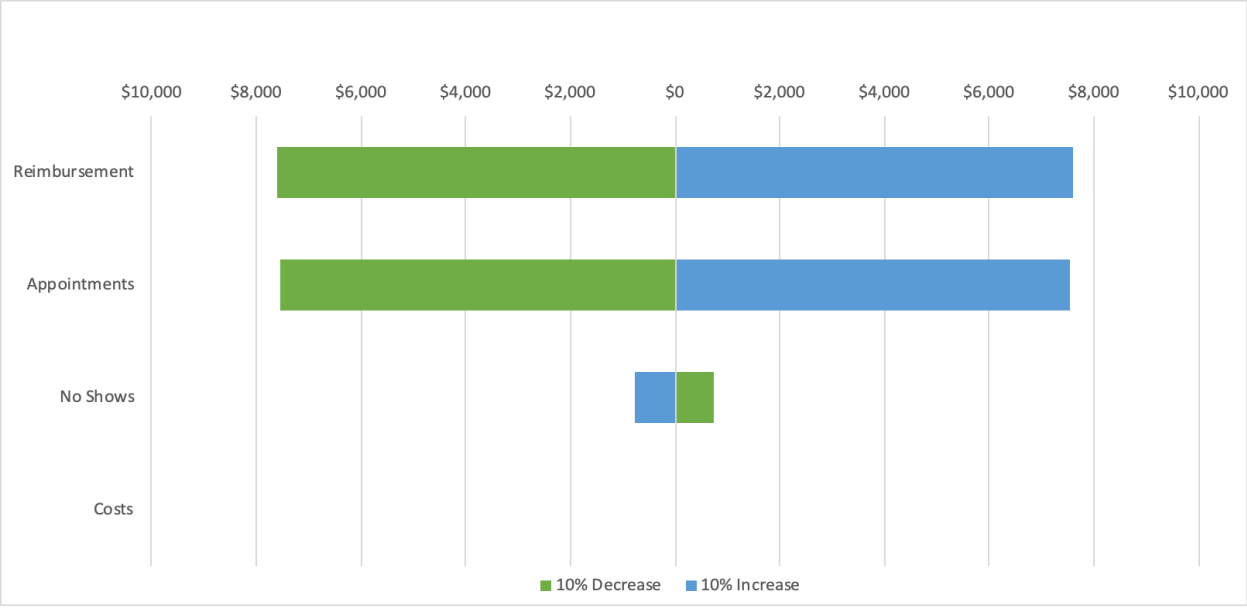
The sensitivity analysis on net revenue showed reimbursement rates was most sensitive to changing net revenue creating a 19% change in net revenue. The number of appointments was the next variable having high sensitivity to the model. The 10% change in appointments had a similar 10% change in net revenue. Costs and no-shows had an inverse relationship with net revenue. The increase in costs or no-shows drove decreases in net revenue. The 10% change in costs had an 8.5% change in net revenue. Finally, no-shows had the least impact on net revenue. The 10% change in no-shows had a 1% change in net revenue.

Figure 3: Tornado Diagram - Cost



The tornado diagram for costs (fig. 2) shows the impact on costs was similarly impacted by provider costs and number of appointments with 10% changes in either variable driving a 10% change in cost. No-shows had a less sensitive, inverse relationship to costs due to costs being defined as provider salary for kept and walk in appointments. Thus 10% increase in no-shows reduced costs by 1%. Reimbursement had no effect on costs.

Figure 4: Tornado Diagram - Reimbursement



The tornado diagram for reimbursement (fig. 3) had a similar mirrored impact from appointments and reimbursement rate as 10% increases in either variable drove a 10% increase in total reimbursement. No-shows had a smaller inverse relationship with 10% increase in no-shows creating a 1% decrease in reimbursement.

4.4 Base Model Estimates

The base model was created based on a Community Behavioral Health Clinic (CBHC) staffing model. The CBHC models were designed to support large communities. The staffing mix for the CBHC model is: 1 Psychiatrist, 1 Psychologist, 4 counselors and 4 Peer Specialists. The staffing mix was used in base model data for sensitivity analysis and all baseline data for the project. The evidence table showed variation for in person no-show rates with 3 studies showing 8-13% and one study showing 60%. The base model used 15% for in person no-show rate s to account for the much higher outlier rate but still remain in line with the other no-show rates. The telemental health no-show rates from the evidence table ranged from 4-7%, and thus the model used 5% as the telehealth no-show rate. The telemental health reimbursement rate was not clearly identifiable in the research and great variation was noted in when and at what rate providers were reimbursed, especially from state to state. The model used a 90% TMH reimbursement rate to account differences still noted between in person and TMH reimbursement. The model also used a state without parity (South Carolina) so rate differences would be actualized between in person and TMH appointments. The base model used in person and TMH appointments for all staff and ensured staff were working up to 6 hrs daily. The base model appointment mix was set at 60% in person appointments and 40% TMH appointments. The outputs from the base model are listed in Table 3.

Table 3: Base Model Output

	In Person	Telehealth	Total
# Appointments	920	580	1500
# Hours	660	540	1200
# No Shows	138	29	167
Total Costs	$ 19,352.15	$ 15,671.96	$ 35,024.11
No Show Costs	$ 3,181.46	$ 867.67	$ 4,049.14
Lost Revenue Due to No Shows	$ 7,216.61	$ 1,968.17	$ 9,184.77
Total Revenue	$ 43,436.80	$ 32,659.97	$ 76,096.78
Net Revenue	$ 24,084.65	$ 16,988.01	$ 41,072.66

4.5 Scenario Analyses

The scenario analysis was done to take a look at different real world applications and assess how net revenue would be affected by appointment mix. The base model was created with a CBHC model which would care for a larger population. Scenarios assessing more mid sized and small (single provider) models were also created and assessed. The base model was created with a 60% in person appointment to 40% TMH appointment mix. However to assess the different application of appointment mix an 80% in person to 20% TMH, a 50% in person to TMH, and a 20% in person to 80% TMH mix were created for each scenario. The impacts to net revenue were assessed for different TMH reimbursement rates for each scenario as well. Each facility was assessed with a reimbursement rate set at 70%, 80% and 90% of the in person rate to highlight the states and variability in TMH reimbursement. Each scenario was also assessed if the facility was located in a state with payment parity providing TMH identical reimbursement compared to in person appointments.

The base model which was built with a staffing model similar to a CBHC had a facility output of 1500 appointments over a month. The staffing included 1 Psychiatrist, 1 Psychologist, 4 Counselors and 4 Peer Specialists. The staff were given appointments which varied in length from 1.5 hrs to 0.5 hrs. The base model was modified to provide different appointment mix and TMH reimbursement rates. The results for costs and no-shows are in Table 4 and net revenue in relation to different TMH reimbursement rates are reflected in Table 5.

Table 4: Base Model

In Person/TMH mix - 1500 appts	# No-shows	Costs	No-show Costs
80% IP/20% TMH	195	$ 36,210.37	$ 5,013.22
50% IP/50% TMH	150	$ 37,395.66	$ 3,856.32
20% IP/80% TMH	105	$ 38,669.96	$ 2,699.42

Table 5: Base Model Net Revenue

	Telehealth Reimbursement Rate			
In Person/TMH mix	70%	80%	90%	Parity
80% IP/20% TMH	$ 39,189.57	$ 40,880.99	$ 42,572.41	$ 44,263.83
50% IP/50% TMH	$ 33,093.13	$ 37,305.29	$ 41,517.46	$ 45,729.62
20% IP/80% TMH	$ 27,063.04	$ 33,718.56	$ 40,374.09	$ 47,029.61

The base model showed decreasing no-shows (80% to 50% IP appts: -45 NS appts; -23%, 50% to 20% IP appts: -45 NS appts; -30%) and increasing provider salary costs for kept appointments (80% to 50% IP appts: +$1,185.29; +3%, 50% to 20% IP appts: +$1,274.30; +3%) as in person appointments decreased. Increased TMH appointments in facility created less no-shows. However, the revenue changes across different appointment mixes showed increased effect when telehealth reimbursement rates were adjusted. Reductions in IP appointments when TMH reimbursement was 70% of IP rates showed losses of $6,096.44 when going from 80% IP to 50% IP and loss of $6,030.09 when going from 50% IP to 20%. The loss of net revenue when TMH reimbursement was 80% of IP rates was 9% (-$3,575.70) going from 80% IP to 50% and a net loss of 10% (-$3,586.73) when going from 50% IP to 20%. The loss of net revenue when TMH reimbursement was 90% of IP rates was 2% (-$1,054.95) when going from 80% IP to 50% and 3% (-$1,143.37) when going from 50% IP to 20%. The net revenue increased with reduced IP appointments when parity allowed TMH to be reimbursed at the same rate as IP. The net increase when moving from 80% IP to 50% IP was 3% (+$1,465.79) and another 3% (+$1,299.99) when moving from 50% IP to 20%.

Table 6: Mid Sized Clinic

In Person/TMH mix - 640 appts	# No-shows	Costs	No-show Costs
80% IP/20% TMH	84	$ 22,267.71	$ 3,384.84
50% IP/50% TMH	64	$ 22,979.42	$ 2,627.04
20% IP/80% TMH	44	$ 23,717.04	$ 1,869.24

Table 7: Mid Sized Clinic Net Revenue

	Telehealth Reimbursement Rate			
In Person/TMH mix	70%	80%	90%	Parity
80% IP/20% TMH	$ 18,387.82	$ 19,207.74	$ 20,027.67	$ 20,847.59
50% IP/50% TMH	$ 14,784.15	$ 17,096.77	$ 19,409.39	$ 21,722.02
20% IP/80% TMH	$ 11,550.56	$ 15,177.99	$ 18,805.42	$ 22,432.86

The mid sized clinic model was built with 4 providers; 1 psychiatrist, 1 psychologist and 2 counselors. The intent was to show a facility with a more average caseload for an outpatient facility and assess the appointing mix differences and effects to net revenue and no-shows that arise. The mid sized model showed reductions in IP appts resulted in decreasing no-shows (80% to 50% IP appts: -20 NS appts; -24%, 50% to 20% IP appts: -20 NS appts; -31%) and increasing provider salary costs for kept appointments (80% to 50% IP appts: +711.71; +20%, 50% to 20% IP appts: +$737.62; +22%). Additionally, TMH rates were significant in the effect appointment mix had to net revenue. Reductions in IP appointments when TMH reimbursement was 70% of IP rates showed losses of 20% and 22% (80% IP to 50%: -$3,603.67; 50% IP to 20%: -$3,233.59). The loss of net revenue when TMH reimbursement was 80% of IP rates was 11% when moving from 80% IP to 50% or when moving from 50% IP to 20% (-$2,110.97; -$1,918.78). The loss of net revenue when TMH reimbursement was 90% of IP rates was 3% when moving from 80% IP to 50% or when moving from 50% IP to 20% (-$618.28; -$603.97). Parity again cause increased net revenue with reduced IP appointments. The net increase when moving from 80% IP to 50% IP was 4% (+$874.43) and another 3% (+$710.84) when moving from 50% IP to 20%.

Table 8: Small Clinic

In Person/TMH mix - 120 appts/hrs	# No-shows	Costs	No-show Costs
80% IP/20% TMH	16	$ 5,083.58	$ 750.98
50% IP/50% TMH	12	$ 5,256.89	$ 577.68
20% IP/80% TMH	8	$ 5,430.19	$ 404.38

Table 9: Small Clinic Net Revenue

	Telehealth Reimbursement Rate			
In Person/TMH mix	70%	80%	90%	Parity
80% IP/20% TMH	$ 5,760.26	$ 6,010.61	$ 6,260.95	$ 6,511.30
50% IP/50% TMH	$ 4,855.69	$ 5,481.55	$ 6,107.41	$ 6,733.27
20% IP/80% TMH	$ 4,073.00	$ 5,011.79	$ 5,950.58	$ 6,889.37

The small clinic model was built with 1 provider; a psychologist. The small clinic model is intended not only to show appointing limitations small and rural areas may be challenged with but also shows individual provider appointing mix effects. The small clinic model showed reductions in IP appts resulted in decreasing no-shows (80% to 50% IP appts: -4 NS appts; -25%, 50% to 20% IP appts: -4 NS appts; -33%) and increasing provider salary costs for kept appointments (80% to 50% IP appts: +173.31; +3%, 50% to 20% IP appts: +$173.30; +3%). Reductions in IP appointments when TMH reimbursement was 70% of IP rates showed losses of 16% both when going from 80% IP to 50% and when going from 50% IP to 20% (80% IP to 50%: -$904.57; 50% IP to 20%: -$782.69). The loss of net revenue when TMH reimbursement was 80% of IP rates was 9% when moving from 80% IP to 50% or when moving from 50% IP to 20% (-$529.06; -$469.76). The loss of net revenue when TMH reimbursement was 90% of IP rates was 2% when moving from 80% IP to 50% an 3% when moving from 50% IP to 20% ($153.54; $156.83). Parity again caused increased net revenue with reduced IP appointments. The net increase when moving from 80% IP to 50% IP was 3% (+$221.97) and another 2% (+$156.10) when moving from 50% IP to 20%.

5 CHAPTER V DISCUSSION

5.1 Discussion of Results

The primary research question was what are the main drivers of case mix optimization in MH? The results from the scenario analysis showed no-shows, appointment volume, and costs all played a part in driving case mix optimization however the most prominent driver was reimbursement rate. The results underscored the importance of parity in the utilization and viability of TMH. All 3 scenarios had higher overall reimbursement with parity. The only option in which net revenue increased with decreasing IP appointments was when parity was enacted. The TMH rate set at 90% of IP rate did provide a much smaller discrepancy in net value compared to higher IP appointment mix. The TMH reimbursement rate being set at 90% allows facilities to see less no-shows and potentially more satisfied patients and the ability to reach a larger population at a minimal loss in revenue. The net revenue difference of 2-3% with TMH rates set at 90% provide a true mark where facilities may need to make considerations for benefits outside of revenue and see little benefit to pushing more IP appointments. However, TMH reimbursement rates at 80% or lower cause substantive losses to net revenue (9-11% revenue loss). The lost revenue is substantive, especially for a smaller facility when looking at managing profitability and maximizing profit.

The mid sized clinic had the largest difference in net revenue when TMH reimbursement was set at 70% and moving from 50% IP to 20% (22% loss in revenue). The net revenue loss appeared to peak in the mid size clinic model and for the 70% TMH reimbursement rate. The model may show less impact when larger or single provider models and shows mid sized clinics may be more susceptible to appointment mix oversight with lower TMH reimbursement rates. The impact of appointment mix in all 3 scenarios had increased losses with increased loss of IP appointments when TMH reimbursement was less than 90%. The need to maximize TMH appointments is not apparent unless operating in TMH and appointment mix has minimal impact to facilities which operate in 90% TMH reimbursement rate levels. Managing appointment mix is critical for all facilities once under 90% TMH rates and the appointing mix

is in favor of IP appointments.

The secondary question is how does no-shows affect revenue? The difference in no-shows with increased TMH appointments was consistent with each move from 80% IP to 50% appointments and 50% IP to 20% appointments resulted in 3% reductions in no-shows. TMH continued to improve no-shows and provide more appointments for facilities to utilize however, the impact to total net revenue was not significant. The benefits to decreased no-shows would allow greater access to patients, less lost provider time, greater ability to collect revenue however reimbursement rate levels for TMH appointments had greater impact on net revenue.

The sensitivity of reimbursement rate and significant impact TMH reimbursement had on net revenue underscores that of the different ways to increase net revenue (cut costs, increase appointments or cut no-shows) the primary driver in net revenue was reimbursement rate. Facilities that are looking at viability and working to increase bottom line funding should start with increased reimbursement rates. The volume of appointments or reduction in costs or no-shows had much less effect and would not be as significant in overall impact. The scenarios and models do not take in all the complexities and all the avenues overall costs and overall revenue interact within a facility so further research would be needed to focus on that area to confirm reimbursement rate's prominence in driving net revenue.

5.2 Limitations

The study limitations were there was no previous research on this specific topic. Thus, many of the assumptions and data was derived and created based on previous researcher knowledge or data from other studies that were not focused on appointment mix. The model was created to be generally applicable and modifiable for a broad audience, but due to limitations in research on this topic there could be shortcomings and unidentified issues with the structure and model parameters.

5.3 Future Research

The research into appointment mix and how best to optimize appointments offerings for MH facilities was lacking. The future of this project would be inclusion of fixed costs (such as facility costs)

as well as non-provider time variable costs (such as admin salary, provider admin time, etc.) to get a clearer picture on actual total costs and compare to reimbursement rates to better understand fiscal viability of organizations. Additionally, application of the model and testing effects on revenue based on predictions would be a next step in advancing better understanding of TMH and in person appointing and revenue.

5.4 Conclusions

The state of MH to date shows a gap with demand well exceeding the supply of providers and appointments available across the country. The impact on rural communities is significant as the availability of MH providers have decreased these areas have been hit the hardest. TMH offers a new avenue to expand the reach an individual provider or facility can have. However, the many nuances of TMH has caused challenges in it's being accepted, either due to healthcare structural issues such as licensure requirements when treating pateints across state borders or process issues such as effective appointing processes. The many issues that have challenged TMH adsorption show it's a complex issue however reimbursement rate has shown to be a prominent issues with in person appointments being reimbursed at higher rates than TMH due to payer restrictions and decreased reimbursement rates. The model built for this project also bore out that reimbursement rate was the primary driver in net revenue and pariy for all provider types was the only way increased TMH usage outperformed increased IP appointments. Continued research is needed but the case for parity is clear and strengthened with this study and if TMH acceptance and utilization is desired once the pandemic has passed then stronger policies and legislation to support parity will be needed to maintain it's increased usage post-COVID-19.

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