Technology's Acceleration in Behavioral Health: COVID, 988, Social Media, Treatment and More



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Technology's Acceleration in Behavioral Health: COVID, 988, Social Media, Treatment and More

Stephen Phillippi, PhD, LCSW, CCFC
Affiliation

Brian Bumbarger, PhD, Med
Affiliation

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Abstract:

Advances in technology offer options for the millions of Americans who experience mental health conditions, since most lack access to care or are not receiving the care they need. The permeating presence of technology in our lives offers a previously unimaginable window on both population and individual level data to inform models of epidemiology and etiology of mental health and mental illness, and the potential to provide behavioral health care in drastically different ways. While much of the advances have focused on access, growing attention is being given to quality. This quality includes issues of confidentiality, ease of use, reimagining therapeutic relationships, and improving mental health outcomes. This change has been accelerated by the COVID pandemic, particularly when the need arose to rely on technology vs. traditional in person treatment. This paper explores telehealth, artificial intelligence (AI) in social media, 988, apps, software and more related to behavioral health. As the evidence of effectiveness grows, behavioral health technologies have the potential to reach more clients and help engage and retain them in services in a cost-effective manner. It will also be critical to ensure that the use of technology is done with a sense of fairness and equity so that any individual, in any setting, can have access to equivalent care. Thus, it is imperative that there be intentionality surrounding the advances in the use of technology to avoid a second tier "behavioral healthcare-lite" system for marginalized populations that in fact have the highest needs but are hardest to reach.

Highlights:

- Technology can increase options for the nearly 1 in 5 Americans who experience a mental health condition, since most lack access to care, and over half are not receiving the care they need.
- Tele-mental health potentially addresses two significant problems in behavioral health: the critical shortage of behavioral health professionals and the logistical and financial challenges of providing services to rural populations.
- There are intentional efforts by software developers to encourage the public to engage technology for behavioral health, self-help.
- Social media platforms are using artificial intelligence to detect and communicate regarding mental health concerns, particularly related to suicide.
- It is critical to ensure that the use of technology is done with a sense of fairness and equity so that any individual, in any setting, can have access to equivalent care.

Recommendations for the post-COVID-19 future:

1. Much more empirical evidence is needed to determine the effectiveness of behavioral health technologies in relation to populations and specific mental health conditions. As that evidence grows it is also critical that translation of that science into practice happens in order to reach more consumers and help engage and retain them in needed services in a cost-effective manner.
2. Technology, particularly the increased capacity to capture and analyze large data sets, will allow new examinations of individual and population behavioral health and subsequently strengthen our etiologic models and the potential design of new interventions.
3. The drastic changes in the delivery of behavioral healthcare, brought on by technology, demand a re-examination of the supporting infrastructure and workforce to ensure that high quality is maintained as access increases.

As of 2021, 97% of Americans owned a cell phone, and over 85% owned a smart phone, compared to just 35% owning a smarty phone just a decade ago.[1] Furthermore, 72% of U.S. adults say they use at least one social media site (up from 43% just a decade ago).[2] Among 18- to 29-year-olds, approximately 84% are social media users, followed by 81% of persons between ages 30 to 49, 73% of those 50 to 64, and 45% of 65 and older individuals.[3] These technologies offer options as more than 43 million Americans, nearly 1 in 5, experience a mental health condition, most lack access to care, and over half are not receiving the care they need.[4] In addition to opportunities for general use, the ubiquitous presence of technology in our lives offers a previously unimaginable window on both population and individual level data, which can inform models of epidemiology and etiology of mental health and mental illness. As such, technology has the potential to transform behavioral health care delivery in drastically different ways.

> *Digital and mobile technologies hold enormous potential for increasing access to services, facilitating self-help, monitoring and assessing variations in symptoms and wellness-promoting activities, and increasing health literacy. This potential will be fulfilled only if behavioral health service providers are willing to adopt effective new technologies, to develop the adequate skills to use them, and to fully support service users.*
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> –Nemec and Chan, 2017. p341

Technology in behavioral health care is evolving at a rapid pace. Nevertheless, there are three cornerstones of effective behavioral healthcare that need to be considered regardless of the technological advancement. These cornerstones include access to care, timeliness of service delivery, and high-quality services. Although much of the technological advances have focused on access, growing attention is being given to the quality of services. This includes issues of confidentiality, ease of use, reimagining therapeutic relationships, and effects of technology used to provide services with positive mental health outcomes.

Three cornerstones of effective behavioral healthcare:

1. Access to care
2. Timeliness of service delivery
3. High-quality services

COVID-19 fueled the rapid growth of technology implementation in mental health care delivery due to the need to transition away from traditional in-person treatment given the public health measures to control coronavirus spread.[5] Technology will undoubtedly be a part of the future of mental health care systems, but not without growing pains and issues. This paper, *Technology's Acceleration in Behavioral Health: COVID, 988, Social Media, Treatment and More,* examines recent advances in mental healthcare technology and discusses relevant issues to their implementation Topics addressed include:

- telehealth technology
- 988 tech & mobile crisis response
- artificial intelligence in social media
- mobile-mental health apps
- emerging technology

The paper concludes with a discussion of workforce development around technology, infrastructure needs, and recommendations for the field.

Telehealth Technology

One of the most apparent uses of technology in behavioral health has been the advent of remotely delivered treatment services, often referred to as telehealth. Telehealth for mental healthcare, or tele-

mental health saw a dramatic increase in utilization during the COVID-19 pandemic. Tele-mental health potentially addresses two significant problems in behavioral health: the critical shortage of behavioral health professionals and the logistical and financial challenges of providing services to rural populations.

The relationship between the recent dramatic increase in tele-mental health and the COVID-19 pandemic is complicated. Like previous natural disasters, the COVID-19 pandemic led to increased mental health stressors across the population, restricted movement, and drastic disruption to the traditional health care system, including mental and behavioral health care. Prior to the pandemic, a loose national agenda had already been underway to increase the use of tele-mental health in order to expand access to behavioral health services in rural and underserved communities, but the quarantine orders that came to most states early in the pandemic forced an urgent shift to remote behavioral health services. The pandemic revealed the critical limitations of conventional in-person behavioral health treatment, as well as the fragility of the traditional referral networks patients and practitioners have come to rely upon to connect people to needed services. Policymakers recognized this fragility and need for adaptations by offering regulatory flexibility, and providers and practitioners developed innovative strategies to quickly pivot to a variety of remote delivery models, potentially reaching new patient populations.

As a state-level intermediary supporting the improvement of behavioral health services for Medicaid-eligible children, the Center for Evidence-to-Practice at Louisiana State University both assisted and studied practitioners' transition to tele-mental health during the early months of the pandemic and quarantine order. Most practitioners, whether implementing evidence-based treatment models or otherwise, reported they were able to effectively transition to some hybrid variation of tele-mental health to continue providing services.[6] This transition to tele-mental health was facilitated by temporary regulatory flexibility in Medicaid and HIPAA regulations, support from national model purveyors (such as Multisystemic Therapy and Functional Family Therapy), intermediaries (such as the Center for Evidence-to-Practice) and professional support networks, and practitioners' own innovation (e.g., developing hybrid models that combined video teleconferencing, chat and text messages).[7] Although most providers were able to successfully shift to tele-mental health in this setting, they reported, and separate Medicaid claims data confirmed, a significant decrease in the number of referrals received and clients served in the first six months of the pandemic (a time when one would expect both referrals and clients to increase significantly). This not only challenges the tele-mental health goal of expanded access to behavioral health services, but also raises concerns about the potential of increasing disparities in already underserved populations such as those living below the poverty line, of minority races/ethnicities, or living in rural areas.

Similar to Louisiana's experience, the National Association of State Mental Health Program Directors (NASMHPD) Research Institute found that nearly 88% of state mental health systems reported their community providers experienced a significant decrease in clients since the beginning of COVID-19.[8] Of these providers, 71% reported that decreases have been significantly, but not totally, offset by the use of tele-mental health, and 15% reported that tele-mental health has not significantly offset the loss in clients, indicating an overall net reduction in clients served in both cases.[9] Likewise, respondents to the NRI survey reported that the added regulatory flexibility with Medicaid and HIPAA was invaluable in transitioning to tele-mental health during COVID-19. This emergency transition to tele-mental health has important implications for the financial stability of community behavioral health providers as well, with NRI reporting that 29 states have had to provide supplemental funds to community providers to keep them solvent, at a time when those providers should be investing in technology and training to effectively use it.

Another important consideration for the field's rapid shift to tele-mental health delivery of behavioral health services is the potential impact on treatment quality and effectiveness. One of the factors slowing the expansion of tele-mental health prior to the COVID-19 pandemic was the seemingly conflicting agenda to scale up evidence-based models. The fundamental argument for prioritizing evidence-based treatment models over standard behavioral health practice was the strong empirical support from randomized trials of these interventions, imparting a much stronger confidence in effectiveness and offering standardized treatment protocols (validated in the same trials) to promote better treatment adherence. Many evidence-based behavioral health treatment models have developed tele-mental health adaptations but have not rigorously tested them in clinical trials. These tele-mental health adaptations are grounded in the same behavior change theories and etiologic frameworks as the original evidence-based versions, so it is unlikely they would be totally ineffective. However, there is evidence that important characteristics of the curative process, such as the therapeutic alliance between patient and clinician, may be negatively impacted by a tele-mental health environment and thus may weaken key outcomes.[10,11]

988 Tech & Mobile Crisis Response

In conjunction with telehealth, states are finding use of this technology with the rollout of 988 and crisis mobile services. Increasing the ease of calling for help in a crisis, requires increased need for effective response. Technology is allowing interconnectedness between call centers, as well as GPS tracking for emergency response and locations of available services.

For example, states are actively engaged in discussions of how to transfer behavioral health crisis calls from 911 (and back if needed). Ruiz (2021) reported that Austin, Texas became one of the first cities in the country to add a fourth options for 911 callers. Operators now ask if the caller needs emergency medical, police, fire, or mental health services. Those in need of mental health services are transferred to a mental health provider. This interconnectedness of services has reported that 86% of mental health calls are now being resolved without the need for police. However, if and when law enforcement is needed for public safety reasons, they remain connected for that request from mental health providers. Austin is not alone, in Phoenix, Arizona an interconnected consortium of nonprofit agencies has built a crisis line and mobile response system, that is handling about 20,000 calls per month, dispatching mental health providers, rather than police, in about 2,200 instances a month, again with the vast majority of calls resolved on the phone.[12] As the new 988 suicide hotline is implemented nationwide, it is anticipated that this will also be further integrated with these system of response.

Colorado has blended its response technologies with telehealth. According to Neylon (2020), writing on behalf of the National Association of Mental Health Program Directors, Colorado is implementing a model that uses trained bachelor's level or peer specialists, who bring tablets into the field when responding to people in crisis. These devices are used to connect the individual to a masters-level clinician via telehealth services to offer a formal triage and recommendations for the level of immediate care assessed.[13] Similarly, in Charleston County, South Carolina EMS is equipped with telehealth technology for mobile crisis teams to triage crises virtually and make recommendations on next steps.[14] This service is structured in a way that quickly places ambulance services back into rotation, reduces mobile crisis drives to longer distance locations if not warranted, and limits over utilization of transport to emergency departments for similar mental health assessment.[15]

Using GPS tracking for emergency location of people and available services can also improve crisis response. GPS location of the nearest mobile crisis response team helps link teams to those in need with the shortest response time options. Having caller id functioning and implementing GPS-enabled technology to more efficiently dispatch care to those in need is also listed in the best practices noted by SAMHSA.[16] According to these guidelines, "GPS-enabled Mobile Crisis Dispatch Mobile crisis teams should use GPS-enabled tablets or smart phones to support quick and efficient call hub determination of the closest available teams, track response times, and ensure clinician safety (e.g., time at site, real-time communication, safe driving, etc.)."[17]

According to SAMHSA, best practices to operate regional crisis call centers should include utilizing real-time bed registry technology to support efficient connection to needed crisis resources.[18] Bed registries, like those implemented in Georgia, show the availability of beds for crisis stabilization, with interactive exchanges between hospitals and crisis teams. According to TTI Bed Registry Project (2019), Georgia's call-center clinicians, walk-in crisis centers, emergency departments, jail staff, and mobile crisis teams can refer individuals requiring a bed for crisis stabilization to a receiving facility. The system monitors bed occupancy as facilities enter bed availability in real time as admissions and discharges occur. System data show occupancy in crisis stabilization beds at 90% or better, denials at 10% or less, and an average length of stay of seven days or less.[19]

Artificial Intelligence in Social Media

Much of technology is being encountered by consumers and communities without individuals necessarily realizing the impact on population mental health, by using artificial intelligence (AI) technologies. AI is defined as intelligence demonstrated by machines as "intelligent agents" that perceive an environment (e.g., social media platforms) and takes actions to achieve a goal, take action, or problem solve.[20] With suicide the second leading cause of death for 15– to 29-year-olds,[21] and US military veterans committing suicide at rates 1.5 times that of the non-veteran population,[22] social media is in a unique position to intervene and attempt to connect those in distress with support.[23,24] Facebook has been using its artificial intelligence to detect and send alerts regarding suicide concerns since 2017.[25] The goal was to get timely help to those posting things that might indicate suicidal ideation and/or send resources to those posting concern about friends or family members suicidality. In practice, Facebook automatically sends messages of concern and links to resources when suicidality is suspected with no human interface. Although this may be better than nothing, it also leaves all of the next steps to the receiver of the message. The effectiveness of these non-human interactions with Facebook artificial intelligence AI remains to be further explored as no data are being shared on outcomes.[26] One study did examine the importance of artificial intelligence interaction with some Facebook users at increased risk for suicide. Specifically, a study of Facebook users with high rates of use, described as addictive, are also known to have higher risk of suicide.[27]

Mobile Mental Health Apps

There are also intentional efforts by software developers to promote the public to engage technology for self-help. This is evidenced by simply picking up your smartphone and typing mental health in your app store. Almost a third of the health-related apps focus specifically on mental health.[28] One will find a myriad of apps that use techniques borrowed from evidence based practices such as Cognitive Behavioral Therapy to address issues like depression, anxiety, post-traumatic stress disorder (PTSD),

obsessive-compulsive disorder (OCD), and more without the presence of a trained provider or physical psychotherapy room/clinic. During COVID-19 several states, like New York, promoted accessible apps to help individuals manage anxiety and social isolation.[29] More data will be needed over time to understand how these tools fit into the array of available supports. Nevertheless, some are quite popular. The top self-help mental health apps of 2021 are listed in Table 1.

Table 1: "Top mental health apps of 2021"[30]

Behavioral Health Focus Area	App Examples	Basic Information
Suicide Prevention		
	MY3	Customize to user warning signs, offers coping strategies, and links to resources.
	notOK	Designed for adolescents as a means to let identified friends, family and support networks know help is needed
General Mental Health		
	What's app	CBT and ACT methods
	MoodKit	CBT based with activities to improve mood
Addiction		
	Twenty-Four Hours a Day	meditations to focus on sobriety
	Quit That!	a recovery tool to track habits to help quit alcohol, smoking, drugs
Anxiety		
	Mindshift	changing how users think about anxiety through encouragement, assisting riding out intense emotions, etc.)
	SAM- Self-help for Anxiety Management	users build their own 24-hour anxiety toolkit from 25 different techniques
	CBT Thought Record Diary	helps identifying negative and distorted thinking patterns
Bipolar Disorder		
	IMoodJournal	personal journal and mood tracker to record mood, symptoms, sleep mediations and energy cycles
	eMoods	track depressive and psychotic symptoms, elevated mood, and irritability to indicate severity of symptoms
Depression		
	Happify	mood-training program
	MoodTools	CBT approach using videos to improve mood and behavior & log thoughts

Behavioral Health Focus Area	App Examples	Basic Information
Eating Disorder		
	Recovery Record	record meals, feelings, and complete questionnaires to track progress
	Rise Up and Recover	track meals and associated feelings, urges, coping strategies
Obsessive-Compulsive Disorder		
	nOCD	mindfulness and exposure response prevention treatment, assessments, and motivation support
	Worry Watch	identify trigger points for anxiety, trends, reflection on harmless outcomes, change of thinking patterns
	GG OCD	games and techniques to increases awareness of negative thoughts and training to push these aside for more positive outcomes
PTSD		
	PTSD Coach	self-assessment, support opportunities, positive self-talk, and anger management tools
	Breathe2Relax	stress management tool teaching diaphragmatic breathing to decrease fight or flight response
Schizophrenia		
	UCSF PRIME	connects to peers to decrease social isolation and options to track goals
	Schizophrenia HealthStorylines	tools to monitor condition, symptoms, medication, and moods
Mindfulness and Mediation		
	Headspace	teaching tools to develop skills of mindfulness and meditation targeting stress, anxiety, sleep, and focus
	Calm	guided meditations, sleep stories, breathing programs, and relaxing music for countering stress and anxiety
	Ten Percent Happier	guided meditations, videos, stories, and inspirational pieces to address anxiety, stress, parenting, sleep, etc.

As noted by Psycom, these apps are not necessarily a replacement for therapy, but they are anywhere from free to very reasonably priced as compared to the cost of traditional mental health therapy. Besides cost-efficiency, they also make help more accessible, with response times in the minutes, and portable.[31] Of course, mental health care apps do not promote equity in access for those that may not be able to afford a smartphone, have access to affordable or free broadband networks, or lack skills to use smartphone technology.

Behavioral health experts in the field are also paying close attention to the benefits and risks of these rapidly emerging apps. According to the National Institute of Mental Health (NIMH), the pros of mental health apps include convenience, anonymity, introduction to care (i.e., first step for those that might avoid care), lower cost, service to a wider population of people, interest (i.e., appeal), round-the-clock access, consistency, support (including for those in therapy), and data collection (e.g. location, movement use, etc.).[32] These advances also come with concern. Currently these include questions about effectiveness, appropriate target populations for their use, as well as appropriate target conditions that they aim to ameliorate, privacy (from IP addresses to who stores what data), industry-wide standards, regulation, and overselling (i.e., promising more than the app delivers).[33] Regarding standards and regulation, NIMH created the National Advisory Mental Health Council Workgroup on Opportunities and Challenges of Developing Information Technologies on Behavioral and Social Science Research in order to offer guidance and monitor rapidly changing use of technologies. In 2017, the NIMH advisory council noted that digital health is no longer limited to the technologically savvy.[34] With more than 2.2 billion people in the world with a smartphone, including almost two-thirds of minority and low-income populations, these mental health technologies are more accessible than ever.[35] Researches have also noted this, as internet-based and mobile device-based data collection for studies has increased with tools for sample population recruitment, retention, and information collection.[36]

The BRIGHTEN study, a randomized controlled study examining the use of technology to deliver mental health treatment serves as an opening to learn about utility and outcomes of these technological tools as augmentations to traditional therapies.[37,38] According to the research findings currently released, the three apps tested to treat depression had a significant impact on mood and level of functioning over time, though one of the limitations turned out to be the challenge in keeping participants engaged in the research itself. The research team is still analyzing data to determine how well the apps treated depression and if one app was better than the others.[39,40]

Still, the largely untested and unregulated mobile behavioral health application market leaves it vulnerable to unscrupulous, unethical, or simply well-meaning but untrained app developers, making it difficult for consumers or even professionals to navigate to mobile apps that are safe, secure, and effective. Although some have argued the breakneck pace of the evolving technology makes it impractical to hold these apps to the same rigorous standards of randomized trials, others have suggested that basing apps on evidence-based treatment models might be a rational compromise.[41,42]

Several entities offer emerging guidance pertaining to these technologies. One advisory board for mental health information technology points out that the many systems of healthcare for serving those struggling with mental health conditions (mental care, physical care, hospitals, etc.) need to treat patients holistically, communicate, and coordinate care. The increase reliance on pay for performance also suggests considerations for integrating technologies. A few highlights are that technology still needs to prove itself; patient engagement is critical to success; and, product quality controls are needed.[43] To this latter point, the group suggest practitioners examine if the product has been tested for use with an intended audience (including RCTs), and if behavioral health professionals (e.g., psychologists, social workers, or other licensed mental health providers) contributed to the development of the technology.[44]

SAMHSA's Using Technology-Based Therapeutic Tools in Behavioral Health Services is an available resource for treatment providers at https://store.samhsa.gov/sites/default/files/d7/priv/sma15-4924.pdf

Emerging Technology

In addition to the commonly used app and social media platforms for the general public, behavioral health providers are increasingly using technology approaches to support their work with consumers. Therapists are capitalizing on these tools to improve care for their clients. They are recommending app use for homework and self-care (see the apps listed above as an example), using them to provide direct care, and supplementing conventional care using ecological momentary assessment to collect frequent real-time passive self-reports and to provide intensive outpatient monitoring.[45,46]

One example of software to assist therapist and clients is Talkspace Online Therapy. Marketed to consumers who "can't afford to visit a therapist but still needing someone to talk to," Talkspace starts at $65 per week and includes text messaging with a trained professional as often as the person needs for support through depression and more for couples and individuals.[47] With benefits listed such as 24/7 access, no commute/transportation and scheduling hassles, seamlessly switching therapists for continuity of care, they are certainly addressing several of the barriers to treatment. For too long, it has been recognized that the top barriers to behavioral health treatment are cost, awareness, stigma, and accessing a provider.[48] However, there are currently no data available to show the effectiveness of this online therapy approach. Funding to support research on the effectiveness of these types of strategies to help populations with diverse needs, could help determine the utility of this approach.

As therapists and therapies become more tech savvy, approaches are emerging to enhance the therapy environment itself. Once such approach is the use of avatars (digital self-representations) to facilitate online communication between therapists, clients, and peers. According to Rhem et al. (2016), there are four key ways that avatars are being used in therapy. These include:

- online peer support communities;
- using avatars to communicate and interact in a therapeutic environment;
- to participate in skills building games; and,
- to communicate with an autonomous virtual therapist.

The research suggest that the use of avatars helps clients engage, form therapeutic alliances, seek treatment due to anonymity, express and explore their identity, and reduces communication barriers while the therapists can control and manipulate treatment stimuli.[49] However, as noted like all these new technologies further research on feasibility, effectiveness, and ethical use is needed.

More research in this area may be coming. Between 2009 and 2015, NIMH awarded over 400 grants and almost $4.5 million dollars to research technology-enhanced interventions designed to prevent or treat mental health disorders.[50] These interventions are trending away from computer use and more to mobile devices and include interactive formats and game-like approaches. They also include both active (engaged treatment) and passive (data collection, artificial intelligence, machine learning and automated responses) for assessment and monitoring.

Technology and Workforce Development

For decades, the United States child and adolescent mental health workforce has suffered from a severe shortage and poor children and rural communities have consistently borne the brunt of that unmet need.[51,52] The COVID-19 pandemic amplified both the workforce shortage and service disparities by

simultaneously reducing the workforce and further isolating children in need. Technology has the potential to address the workforce shortage in three ways:

- technology can potentially be used to reduce the overall prevalence of behavioral health problems by detecting relatively minor problems when they are easier to treat and may be treated through self-help strategies such as the apps described previously.
- technology can potentially be used to increase access to effective treatment models through TMH. As described previously, the use of technology and the dramatic increase of TMH has been a critical strategy to increase access.
- technology can be used to increase the reach, cost-effectiveness and quality of training and professional development for the behavioral health workforce.

Simultaneously however, such dramatic shifts in practice are fundamentally redefining the delivery of children's behavioral health care, and thus will require a significant re-tooling of the workforce. Dissemination and implementation science makes clear that the high-quality, widespread adoption of any significant new technology in a given field requires the use of intentional and adequately funded adoption strategies, including developing and maintaining the required competencies for providers to use the new technologies and the protections of the rights of people who will access the technology-supported services.[53] With subsequent future innovations, it will be important to remember that the technology itself is not self-actualizing, and to adequately plan for, fund, and take the time to develop the workforce capacity necessary to make optimal use of the technology.

Several exemplars have emerged in recent years to demonstrate the innovative technology strategies being employed to build and strengthen the behavioral health workforce. These include:

- The Behavioral Health Education Center of Nebraska's Virtual Mentor Network has created a state pipeline program for future behavioral health professionals using online virtual sessions for rural college and high school students.[54]
- The University of Hawaii has partnered with the Mayo Clinic in a model program to develop an expert children's mental health workforce to serve geographically isolated and culturally diverse communities using interactive video teleconferencing (IVTC) and tele-mental health, strengthening collaboration with local primary and behavioral health providers.[55]
- In Project ECHO (Extension for Community Healthcare Outcomes) a hub-and-spoke virtual training and coaching model originally developed at the University of New Mexico for Hepatitis C care, the Addiction Training and Technical Assistance Center (ATTC) utilized the model to facilitate an IVTC knowledge-sharing network conducting virtual mentoring with locally based substance use treatment supervisors, to enhance workforce capacity to provide clinical supervision.[56] The ATTC chose clinical supervision to test this virtual training and coaching model based on its centrality as a workforce development amplifier.
- Putney et al. (2019) describe an online interactive technology used in advanced level Master of Social Work programs to offer virtual client simulations (PeopleSim) as a tool to train screening and brief intervention and motivational interviewing. The virtual and asynchronous nature of the "patient" offers tremendous cost, convenience, and consistency over traditional live patient training, and students demonstrated significant pre- to post gains in screening and brief intervention skills, motivational interviewing skills, and change planning skills. Though no comparison group was included in the evaluation, this study demonstrates the potential efficacy of this innovative workforce development strategy.[57]

These are just a sampling of some of the innovate technology approaches being used to increase the size and the skills of the behavioral health workforce, offering an exciting glimpse of the future of training and professional development.

Infrastructure Needs

To understand the magnitude of the infrastructure and capacity challenge that comes with the adoption of these multiple technological innovations, it is instructive to look at the adoption of electronic health records (EHR) which began in earnest with the passage of the Health Information Technology for Economic and Clinical Health Act of 2009 (more information available at https://www.hipaajournal.com/what-is-the-hitech-act/) and the associated government stimulus. Although this combination of enabling legislation and financial incentives created rapid expansion of electronic health records over the past decade, the development of the technology and the necessary workforce capacity has been a story of uneven progress of fits and starts, and psychiatry and related fields have had the lowest adoption rate of all subspecialties.[58] Although well-designed EHR systems can increase efficiency and streamline services, it is equally common to see poorly designed or implemented systems with poor user interfaces that increase inefficiencies and errors, risk security breaches, and compromise the quality of health care and patient safety.

For the behavioral health and addiction fields, a new national infrastructure is in place and poised to make good use of technology platforms to provide training and professional development. To address the national opioid epidemic in the years immediately prior to the COVID-19 pandemic, Congress appropriated over $3 billion to the Substance Abuse and Mental Health Services Administration (SAMHSA) to establish a national infrastructure of Technology Transfer Centers (TTCs), including the Addiction TTCs (ATTC Network), Prevention TTCs (PTTC Network), and Mental Health TTCs (MHTTC Network). These TTCs are tasked with building the capacity of the local behavioral health workforce to provide evidence-based interventions.[59] In response to stay-at-home orders in early Spring 2020, the entire TTC infrastructure rapidly shifted its full continuum of training and technical assistance to a multi-tiered virtual platform to offer uninterrupted remote service delivery. The TTCs have reported increased convenience and decreased costs in connecting local service providers with trainers and technical assistance providers, but have also noted inequitable access, especially for rural practitioners and communities, based on bandwidth limitations and some discomfort with technology. Overall, the TTC network represents a great potential national infrastructure for continuing to use technology to strengthen and support the mental health workforce.

Questions Remain

With the advances, questions and concerns have arisen that remain to be addressed. For example, it is not clear how service providers will need to respond when individuals just stop coming to virtual spaces. Another question is what happens when crises emerge, like suicidality, and the provider is only available via text or the client disconnects from a smartphone telehealth session. Some apps use a members IP address to determine exact location to send first responders, but it is often more difficult to determine the client's level of risk in messages. Thus, it is unclear whether crisis response will be over utilized or underutilized. The American Psychological Association points out several other critical issues practitioners must attend to such as HIPAA compliance and patient privacy protections of technology based communications, state licensing laws for practitioners treating patients when their location may

be beyond their legal or ethical treatment allowance (e.g., talking to someone in a state where the provider is not licensed), as well as the ethics and practice parameters with the use of the many apps and platforms that allow users to remain anonymous.[60,61]

Another area of exploration needed regarding the increased infusion of technology is the potential disparities in care between large health care systems versus small providers and individual mental health practitioners. The significant investment in the technology, associated training and maintenance, and necessary cybersecurity may be financially out of reach for small organizations and sole proprietors. Many of these issues were not dealt with at the height of the pandemic when the major driver was to decrease any disruption in services, but as technology is integrated more into the work of behavioral health, these questions will need answers.

Conclusion

As the evidence of effectiveness grows, behavioral health technologies have the potential to reach more clients and help engage and retain them in services in a cost-effective manner.[62] Although technology can drastically increase access to behavioral health care for otherwise marginalized populations, there are many nuanced aspects of it that require further study, and thus it cannot be seen as a panacea. Similarly, although some would argue that the shift to more technological approaches to behavioral health have the unintended potential to disconnect behavioral health professionals from their clients on a personal, human level, there has been a great deal of experience with technology as a result of COVID-19 that has been positive. Consistent throughout the literature is the theme that technology is not intended to replace in-person client contact. The current focus is almost always on how technology, when incorporated into treatment and prevention efforts, can supplement existing methods and provide services to clients who might not otherwise receive treatment. This may change as artificial intelligence and machine learning technology improves, but for now, it appears that technology will be a supplement to other forms of psychiatric care. As the behavioral health field evolves, it will be critical to ensure that the use of technology is done with a sense of fairness and equity so that any individual, in any setting, can have access to equivalent care. Thus, it is imperative that there be intentionality surrounding the advances in the use of technology to avoid a second tier “behavioral healthcare-lite” system for marginalized populations that in fact have the highest needs but are hardest to reach. Aware of the growth and potential, but also recognizing all the unknowns, the American Psychological Association cautions to tread carefully. They urge practitioners to consider the fit of technology with different clients and the seriousness of their level of risk and need.[63]

Tele-mental health, mobile care apps, artificial intelligence, and infrastructure technology have undeniably revolutionized every aspect of behavioral health and will continue to do so as further innovations are developed. As described throughout this article, this suite of technologies has the potential to:

- Dramatically increase access to quality behavioral health care,
- Connect consumers to behavioral health care where and when it is most convenient, potentially reducing barriers of geography and stigma,
- Promote wide scale and unobtrusive assessment and screening to promote early identification of mental illness and substance use issues,
- Empower individuals to self-manage their own emotional wellness, potentially reducing the overall prevalence of serious mental, emotional and behavioral problems,

- Increase the pace, scale, efficiency and accuracy of behavioral health research in order to improve the effectiveness of behavioral health care and reduce morbidity and mortality, and
- Improve the coordination of care.

The United States is in an uncomfortable era in behavioral health care, with one foot in the old way and one foot in the new. The mental health system is seeing the promise of technology but have not yet worked through all the important challenges of the transition. But the promise of technology is undeniable. For technology to demonstrably, collectively impact population-level behavioral health, it will require a coordinated and optimized effort that adequately addresses all three key variables: need, access and quality. Individually, there is ample proof of concept that technology can address each individually. Through low-cost self-help apps and artificial intelligence that passively identifies the earliest signs of dysfunction or dysregulation, the overall prevalence of behavioral health problems could potentially be reduced. Through tele-mental health adaptations of evidence-based treatment models and policy initiatives to ensure adequate broadband access to every home, there is the also the potential to ensure that all who need behavioral health services will have access to them. Technologically innovative training, workforce development, infrastructure advances and quality assurance strategies will help to ensure that behavioral health services are delivered by highly trained professionals ensuring adherence to strict treatment protocols in a coordinated system of care.

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