

Tully, Laura M., Muro, Karina, Hakusui, Christopher Komei, & Smith, Leigh Katherine (*In Press*) **Using Digital Health Technology to Facilitate Measurement-Based Care in the Treatment of Delusions.** In Hardy, K. & Turkington, D. (Ed.) *Decoding Delusions: Demystifying clinical interventions for working with strongly held beliefs.* USA: American Psychological Association

Key Points

1. Research indicates digital health technology tools can address long standing challenges of access to, engagement in, and effectiveness of treatment for psychosis.
2. Measurement-based care is the methodical collection of information on an individual's symptoms, day-to-day experiences, and activities that is then used to drive recovery-oriented clinical decision making.
3. Digital health technology is uniquely poised to facilitate measurement-based care, particularly in the context of CBT in which providers traditionally use worksheets and associated paper and pen tools for facilitating symptom tracking and skill development.
4. We propose six treatment areas in which digital health technology can enhance CBT: Increasing client engagement during assessment, providing innovative options for clients to monitor delusional thoughts, creating more immersive practice options for cognitive restructuring and coping skills, facilitating more accurate relapse prediction and prevention, visualizing important takeaways, and building broader social networks.
5. Considerations of data security and data ownership are important steps in the process of choosing a digital health tool; new regulations coupled with stakeholder driven product designs has prompted more consumer centered ethical data use policies in the digital health tech industry.
6. Given that most digital health technology has been developed by primarily English-speaking teams and access to the digital world in the United States varies markedly by race, ethnicity, and socioeconomic status, cultural and linguistic considerations are imperative when integrating digital health technology tools with client treatment plans.

Introduction

In the early 21st century the phrase “there’s an app for that” became common parlance – an acknowledgment of the exponential increase in smartphone applications available to users looking to address a wide variety of life challenges, such as building social connection, finding romantic partners, monitoring finances, and managing physical and mental health. As smartphones and associated wearable devices have become increasingly ubiquitous, public health scientists have looked to digital and mobile technologies for a variety of health solutions. This has sparked a rapidly growing field of digital health technology research and development; academic researchers and industry actors alike are racing to see who can produce the best viable and scalable solutions for global mental health needs. One such global mental health need is improving outcomes for individuals experiencing psychosis, and we argue that digital health technology has the potential to address long standing challenges of access to, engagement in, and effectiveness of treatment for psychosis.

Although adaptations may be necessary, the idea that common psychosis symptoms such as paranoia make individuals with psychosis unwilling or uninterested in using technology as part of their care has been thoroughly debunked. A large body of research clearly demonstrates that people with psychosis use smartphones and apps as part of their daily life and are interested in using digital health tools as part of their care (Torous, Woodyatt, Keshavan, & Tully, 2019). But, while the number of tools available continues to increase and the data indicate these tools hold a lot of promise, there is a lack of practical guidelines on how to choose the right tool and how providers can effectively incorporate digital health technology into clinical practice. Given the fast pace of digital health technology development, often driven by for-profit companies that do not necessarily submit their tools to the rigorous evaluation of randomized control trials, it is important that as providers we have a framework for evaluating the available tools and determining when and how to use them as part of care.

In this chapter we briefly review the status quo on digital health technology available for use in treatment of psychosis, with a specific focus on the treatment of delusions, and provide guidelines for readers interested in keeping up with the latest research findings. We illustrate how digital health technology can help facilitate and enhance measurement-based care and discuss key considerations when choosing a tool as part of a treatment approach, such as data protections and privacy, costs, ease of use, and cultural considerations. We finish with a detailed case example of integrating technology as part of cognitive behavioral therapy with a young adult Latinx client experiencing suspiciousness/paranoia.

This chapter cannot provide an exhaustive list of the ways in which technology can be used to support treatment of individuals experiencing delusions and other symptoms of psychosis; nor can we expect this chapter to remain up to date given the rapidly evolving field of digital health technology. Instead, we aim to give readers a framework for understanding how technology can be used in treatment and how to choose a tool that best-fits your treatment goals. We provide practical examples of how clinical techniques and practices that you are currently using can be enhanced with technology as part of your standard clinical approach. All recommendations are provided in the context of a cognitive behavioral framework - the recommended evidence-based practice for the treatment of delusions and associated symptoms of psychosis.

Status Quo of Digital Health Technology for Psychosis

The current status of digital health technology developed for psychosis and related symptoms can be divided into three categories:

1. Smartphone applications or web-based social media style platforms designed to promote wellness, prevent relapse, and reduce hospitalizations via symptom monitoring, the provision of educational content, and/or prompting coping skills use. These platforms range from those designed to be used independent of current treatment or in tandem with an individual's treatment team.
2. "Brain game" style cognitive training software (either application or web-based) designed to address common cognitive impairments characteristic of psychotic disorders (e.g., attention, working memory, executive functioning, face and emotion recognition).
3. Immersive video game style and/or virtual reality (VR) technology designed to be used therapeutically to target specific symptoms (e.g., VR environments for threat-belief testing).

To date, research has primarily focused on the first two categories. Overall, studies indicate digital health technology tools can facilitate treatment engagement, symptom monitoring, reduction of paranoia/suspiciousness, reduction of negative symptoms, and improve social and occupational outcomes (See Garety et al., 2021 for a recent trial using digital CBT to address paranoia; See Torous et al., 2019 for a brief and accessible review). Similarly, cognitive training leads to improvements in global cognition that appear to last after training is finished and are associated with changes in brain structure and function. However, *how* cognitive training is delivered matters when it comes to

generalization of gains to the real-world: the largest gains are achieved when cognitive training is done as part of other treatment approaches (supported education and employment services, skills training, cognitive therapy); simply doing brain games on an app in the absence of other supportive treatments does not appear to lead to meaningful real-world benefits (Green, Horan, & Lee, 2019).

The third area of research examines the potential of immersive video game and virtual reality technology for alleviating specific symptoms of psychosis. For example, AVATAR therapy targets auditory hallucinations using a computer-generated character meant to personify a particularly distressing auditory hallucination. This character is voiced and controlled by the therapist, enabling client and provider to test various scenarios and ways of responding to/coping with hallucinations. Compared to a control group that received supportive counseling, individuals who received AVATAR therapy reported lower levels of auditory hallucinations and associated distress (see Rus-Calafell & Schneider, 2020 for a review). Studies directly addressing the impact of VR interventions on delusions are limited, but findings are promising, particularly for addressing suspiciousness/paranoia. Overall, studies indicate that conducting behavioral experiments, such as threat-belief testing sessions, in the VR environment (vs. in vivo) leads to a reduction in paranoia compared to treatment as usual (Geraets et al., 2020; Pot-Kolder et al., 2018) and compared to those who were exposed to the VR platform without belief testing sessions (Freeman et al., 2019). This supports VR as a promising intervention platform, particularly in cognitive behavioral approaches, as the virtual environment offers a real-world analogue for repeatedly testing beliefs and conducting behavioral experiments. However, video-game style and VR technologies currently have significant and cost-prohibitive implementation barriers, including the need for complex head mounted displays and high-powered computing resources; until these barriers are removed, AVATAR therapy and VR are unlikely to be a widely available and accessible treatments for psychosis.

However, the use of technology in the treatment of delusions and other psychotic symptoms does not need to be as technologically complex as VR or require specially designed applications or wearable devices. Simple text message reminders have been shown to raise treatment engagement (D'Arcey et al., 2020), and integrating existing digital tools to facilitate measurement-based care is accessible and can range from relatively simple approaches (e.g., supporting clients in using the notes app on their smartphone to track their symptoms) to complex approaches (e.g., using an application specifically designed to prompt clients to practice daily coping skills). Indeed, we argue that the potential for digital health technology to help individuals with psychosis reach their recovery goals is less about the specific tool and more about

how providers can use digital health technology to support and enhance existing evidence-based approaches within a measurement-based care framework.

Measurement-Based Care

What is measurement-based care?

Measurement-based care (MBC) is the methodical collection of information on an individual's symptoms, day-to-day experiences, and activities that is then used to drive recovery-oriented clinical decision making. MBC at the individual level is known to improve client outcomes, and at the aggregate level for guiding system-level changes in treatment delivery (Fortney et al., 2017). When working with clients, you will likely encounter multiple streams of information that must be integrated into a single conceptualization of the client's strengths and challenges to guide treatment. Integrating multiple streams of information is challenging; indeed, clinicians report that one of the primary barriers to feeling more empowered in their jobs is being asked to juggle too much information at once and not having the time to focus on the pieces that matter most. At its core, MBC involves identifying *which* information you think is the most important to attend to and then finding a way to assess it systematically. This is typically done through administering validated scales that have already been designed and calibrated to obtain specific information, including details about your clients that change over time (e.g., symptoms), details that tend to stay the same (e.g., personality), their positive experiences (e.g., life satisfaction), their negative experiences (e.g., depression), their experiences with you (e.g., therapeutic alliance), and their response to treatments (e.g., effectiveness of interventions). The information you gather is data, and collecting data is like creating a collective memory that reflects the lives and stories of your clients. The more data you collect and the more people you collect it from, the richer and more inclusive that collective memory becomes. Integrating technology into your treatment approach can help transform the information you gather into insights that matter to your clients.

How can technology facilitate measurement-based care?

First, technology can help you gather information more efficiently through things like digital note-taking applications or private online journals that clients can record their thoughts and feelings in. You can also streamline your

data collection by administering surveys and questionnaires through online software (e.g., Qualtrics, Survey Monkey) instead of with a pen and paper; this may seem like a trivial shift but using technology to collect data allows you to consolidate all your information in a central location, and then easily download your results so they can be quickly prepared for review.

Second, technology now facilitates ways to collect information from your clients that are actively engaging, rather than passive and impersonal: from beautiful applications and websites that summarize information in visually appealing and easy to understand formats, to providing automated feedback to clients in real time, to using virtual reality headsets that lead them through treatment exercises. Using interfaces that inspire clients to share their stories with you rather than drag them through the process reluctantly can increase both the quality and quantity of the information you obtain.

Third, technology can help communicate key takeaways faster through features like graphs and data visualizations. Humans process images approximately 60,000 times faster than text, so using software to visualize the most important information can make communicating (and understanding) key takeaways much easier.

Fourth, despite some criticism that technology is pushing humans apart, when it is used thoughtfully it is unparalleled in its ability to bring people together. For example, practitioners can now connect their clients to broader communities of support where they can interact with other people who are having similar experiences. Most recently this has been done via social networking platforms developed specifically for individuals experiencing psychosis, including platforms that promote peer-to-peer interactions such as HORYZONS and PRIME (both for individuals with recent-onset schizophrenia), CLIMB (for individuals with chronic psychotic disorders), and Momentum (for individuals at clinical high risk for developing psychosis). See Biagianni et al. (2018) for a review of peer-to-peer social networking interventions.

Lastly, massive advances in computing technology have automated many complex processes that historically had to be done manually. For example, machine learning algorithms can be used to make predictions about what a client will need, want, hate, and enjoy -- and although this is most effectively used in conjunction with the guidance and opinions of humans, it can drastically lighten the load of designing treatments that are more uniquely tailored to a client's particular needs.

How might we integrate measurement-based care and technology into CBT?

As an example, let's consider how a cognitive behavioral therapist might integrate technology into their treatment plan. CBT is information-heavy by nature: clients are encouraged to critically examine their thoughts, feelings, and behaviors; develop a logical narrative for how they are linked; and complete exercises and activities to strengthen their self-awareness, evaluate maladaptive thinking patterns, and develop adaptive coping skills. MBC is a core principle of CBT and providers traditionally use worksheets and associated paper and pen tools for facilitating symptom tracking and skill development.

Imagine that instead of static, unresponsive worksheets, clients could complete their exercises on their smartphone and receive immediate feedback that branches them to certain follow-up exercise depending on their responses. Imagine that they could receive alerts to complete their exercises at the times of day that worked best for them, based on real-life input such as their sleep schedule or when they are most active on social media. Imagine that they could view a graph of how their thoughts, feelings, and behaviors changed over time, and be given data-rich predictions about what to expect moving forward. Digital health technology can be designed to support a client in telling a richer, more complete version of their own story and help them fill in areas that might otherwise be blank.

We propose six treatment areas in which digital health technology can enhance CBT: Increasing client engagement during assessment and information collection, providing innovative options for clients to monitor delusional thoughts and engage in self-reflection, creating more immersive practice options for cognitive restructuring and building coping skills, facilitating more accurate predictions of client symptoms and behaviors (i.e., relapse prevention), visualizing important takeaways, and building broader social networks. Table 1 summarizes current practices for these six treatment areas, provides tips on how technology could enhance or facilitate these activities, and provides different options for technology based on provider/client comfort level with technology (beginning, intermediate, advanced).

[insert table 1 about here]

Considerations When Choosing a Digital Health Tool

We recommend considering the following factors to help you choose the most appropriate digital health tools as part of your practice: cost & access, ease of use & user experience, data protections & privacy, and cultural & linguistic

considerations. We provide some guidelines for each of these considerations below. We also recommend checking the One Mind PsyberGuide (www.psyberguide.org) for the latest developments in digital health technology. One Mind PsyberGuide is a non-profit project that provides best practice guidelines for mental health technology development and publishes rigorous evaluations of new tools, including scores for many of the considerations listed below.

Cost & Access

Cost is a very practical barrier worth considering when choosing a digital health tool. If there is a cost, it is important to determine who is responsible – is this a service your clinic needs to budget for (e.g., annual licensing fee for a certain number of users) or is it a tool that clients themselves can buy (e.g., an application on their smartphones)? Beware of free tools; many free applications make their money through advertisements that can disrupt the user experience, by selling user data to third parties, or by asking users for permission to mine data on their social media profiles. This is not to say a free tool shouldn't ever be used, but we recommend first investigating what “free” really means by reading the terms and conditions and making an informed choice (see Ethical Considerations below).

Related to the cost of the tool is access – do you or the client need special equipment to use the tool, such as a particular model of smartphone, or access to a laptop/personal computer? Do you and the client need to create profiles and log ins? Does the tool work via cellular data or include the sending and receiving of SMS messages, and what are the implications for the client's cell phone costs? The answers to these questions can help you estimate the level of technical support that you and the client might need to get started with the tool. With this information you can make an informed decision about which tool has the lowest access barriers for your clients.

Ease of Use & User Experience

Onerous sign up and log in processes, glitchy software, or complex features that lack intuitive design will reduce you and your client's motivation to use the selected tool (Kumar et al., 2018). Simple, intuitive designs that require little upfront learning and have streamlined log in access are likely to work best. This means you do not have to select the most complex, feature-rich tool; simple surveys about a client's mood, symptoms, and daily experiences that are summarized in the application or on a web-based dashboard can provide rich datasets for identifying early warning signs of symptom exacerbations and help guide treatment progress (Torous et al., 2019). We recommend testing out the tool before

introducing it to your clients so that you can get hands on experience with it and evaluate whether it is relevant for your treatment approach. If the tool you wish to test is behind a paywall, we recommend contacting the developers as many companies can provide a free trial or demonstration.

Ethical Considerations: Data protections & privacy

When deciding to use digital health technology as part of treatment, it is important to consider how the technology in question handles user data, both in terms of security and privacy (i.e., where and how the data are stored; what protections and protocols are in place in the instance of a data breach) and in terms of data ownership and control (i.e., does the user own the data and can the user request deletion of their data from the database). This is particularly important when working with vulnerable populations. For example, many smartphone applications targeting physical and/or mental health are offered for “free” in that there is no price the user must pay to install the app on their device. However, the hidden cost is often in what data is being collected about the individual and how that data is handled. Companies offer the product for free; in return, the user agrees - typically via a long and obtuse terms of agreement document (the “end user license agreement”, or EULA) - to give the company access to their data. Depending on the tool, this access may be very broad and include multiple types of data from the user’s device, such as GPS location data, movement data, device use data (e.g., screen time, time spent in certain applications etc.), and communications data (e.g., number of phone calls / text messages sent and received). The upside to this approach is that companies can leverage the power of big data to develop important insights about its users, which could lead to individualized health recommendations and improved outcomes. This has been termed “digital phenotyping”, i.e., the describing of a person’s health and behavior using multiple types of digital data, often mined from devices without active user input (Onnela & Rauch, 2016). Digital phenotyping is the holy grail of mental health technology research as it has the potential to solve big questions about mental health with minimal burden on the user. The darker side to this approach is that users may be unaware of the extent of data sharing that they agreed to, and companies often support their product financially by selling user data to third party companies. Recent high-profile cases of data misuse (e.g., Facebook’s highly criticized non-consensual collection of user data with Cambridge Analytica in the 2010s) have brought this aspect of digital technology into stark reality, eroding trust and highlighting the importance of user informed consent, guidelines for ethical data use, and privacy practices.

Despite the inherent risks, concerns about data privacy should not deter you from using technology as part of your treatment approach. With new regulations coming into effect (e.g., the implementation of the General Data Protection

Regulation rules in the EU in 2018 and the analogous California Consumer Privacy Act implemented in July 2020) and a growing field of stakeholder-driven mental health tools with clear and ethical data use practices detailed in their EULA, safe and ethical options are becoming more available. The point here is to learn how to be an informed consumer in this field - how do you evaluate what the technology in question is doing with user data and what are some key considerations you should consider when choosing a tool? We provide five key questions to ask of a potential tool. Most of the answers will be found in the EULA, specifically the section on data privacy, which can typically be found on the company's website or in the application itself. We estimate it will take approximately 10-15 minutes to determine the answers to these questions.

1. What data will the application/technology gather from the user?
 - a. Active input data such as survey responses, ratings, diary entries and/or pictures.
 - b. Passive data such as GPS and movement data, IP addresses, or screen time.
2. Will that data be identifiable or de-identified?
3. How will the company/software developer use the data?
 - a. Quality improvement efforts, such as bug fixing and product improvement. This is common for many applications and typically means the data remains internal to the company and is deidentified.
 - b. Advertising efforts, such as capitalizing user data to identify other products they may be interested in.
 - c. Sold to third parties for revenue.
4. What control does the user have over the data?
 - a. Can the user request to see their own data? If so, how do they do this and in what format does the data come in?
 - b. Can the user request to delete their data? If so, how is this done?
 - c. Can the user specify which data are being used (i.e., if the application has the capacity to collect passive data from multiple sources on the device, does the user have the option to turn some of this data sharing off).

5. Does the company detail any limitations to privacy and confidentiality of data? Companies often have clauses in their EULA around the disclosure or transfer of user data, including in instances of suspected illegal activity, breaches of terms and conditions, or to outside third-party services that manage business operations like email lists, website development and maintenance, and marketing.

Once you have the answers to these questions, you and your client can make an informed decision about whether and how to use the technology. Clients will vary on their level of comfort - some may be unphased by wide data sharing and others may feel strongly about data control. Being prepared for this discussion and knowing how to find out the answers to these questions will help you choose the right tools for your work and help you support your clients in becoming informed digital consumers.

Cultural & Language Considerations

Most digital health tools available in the United States (US) are developed by English speaking groups for use in English speaking populations; for clients and families whose primary language is a language other than English, this presents a significant barrier. Similarly, access to technology and the digital world varies markedly by race, ethnicity, and socioeconomic status: 2015 census data demonstrated 36.4% of Black and 30% of Hispanic individuals did not have access to a computer or a broadband internet connection compared to 21% of Whites (U.S. Census Bureau, 2015). This pattern persisted through 2019: 82% of White individuals reported having access to a computer, compared to 58% of Black and 57% of Hispanic individuals (Pew Research Center, "Home broadband adoption, computer ownership vary by race, ethnicity in the U.S.," 2021). Consistently, non-white ethnic racial minorities have limited access to digital tools, creating numerous barriers for them to take part in the digital world. The barriers are even more visible now during the global coronavirus pandemic, as there are significant ethnic and racial disparities in education, employment, and health care.

In addition to access, it is important to consider cultural factors, beliefs and attitudes around digital health technology when thinking about using digital health tools as part of clinical care. For marginalized communities, historical abuses by the medical system such as the 40-year-long Tuskegee syphilis study which exploited black men and the non-consensual of Henrietta Lacks' cells for the advancement of IVF technology has led to an understandable mistrust of digital health technology and the institutions promoting it. For Latinx individuals, undocumented status and evolving

immigration policies contribute to their fear in seeking medical care, including that of providers utilizing digital health technology tools that elicit concerns around government monitoring. This historical perspective combined with current sociopolitical contexts in the United States are important considerations when proposing digital health technology as part of your treatment approach with individuals from marginalized communities.

Cultural and linguistic considerations should be at the forefront of our practice: The U.S. continues to diversify rapidly, with four in ten Americans identifying as non-white in 2020 (U.S. Census Data, 2020). In California – our home state - approximately 60% of the population identifies as non-white, many of them are new immigrants to the US, and 44% of Californian’s speak another language other than English (Bhushan et al., 2020). As we work to integrate digital health tools into mental health services, it is imperative that we consider cultural and linguistic factors. Here we focus on specific considerations regarding digital health technology when working with Latinx individuals, one of the fastest growing ethnic groups in the U.S.

Specific Considerations for working with Latinx Clients and Families

Latinx individuals are the second fastest growing ethnic group in the U.S., making about 18% of the total US population. They are a culturally heterogenous group and are from various geographic backgrounds in Latin America including Mexico, South and Central America, and the Caribbean (Fortuna, 2019).

For many Latinx client’s, having a mental health diagnosis is stigmatizing and access to and utilization of mental health services is challenging. In combination with a thorough understanding of relevant cultural values/factors (i.e., a cultural formulation), digital health technology has the potential to improve access, utilization, and quality of mental health services for this underserved population.

Latinx households are often characterized by a mixed-status (i.e., undocumented parents and U.S. born children) and multi-generational, often compromised of both immediate and extended family members. In a clinical setting, it is common to work with adolescent and young adult clients who are bilingual, speaking both Spanish and English, while their parents are monolingual, speaking only Spanish. As such, there may be varying degrees of English language proficiency and literacy between the client and their family, and these differences should be considered when using digital health technology.

Even though Latinx families are heterogenous, there are important shared cultural beliefs, values, and attitudes that shape and impact mental health care, and in turn, the use of technology in measurement-based care. A few of the core

Latinx cultural values that influence treatment and utilization of mental health services include *familismo* (i.e., the value placed on family and loyalty), *personalismo* (i.e., the importance of interacting with others in a warm and caring manner), and *respeto* (respect for others and especially authority figures). The cultural value of *familismo* is especially crucial because immediate and/or extended family members may need to help clients with the use of technology during sessions (i.e., logging on to a telehealth session, reconnecting to the internet, setting up reminders on a smartphone app, or communicating via text messaging). Furthermore, having a clear understanding of who is part of the family system is important, as certain family members may need additional technology-based education presented in their preferred language, or in a manner that is tailored to their English proficiency level. These cultural values need to be both thoroughly assessed and considered with each Latinx client, as they will affect each client differently.

Acculturation level also needs to be assessed, as it can shed light on the best and most practical ways to provide education and support when utilizing digital health technology tools. For example, is your Latinx client a first- or second-generation American who may need more time to understand the importance of mental health services, and in turn, additional time to learn and practice using digital health tools? Other Latinx clients may already be savvy with the use of technology and need a completely different level of guidance when using digital health technology as part of their treatment. Likewise, an assessment of access to technology (i.e., internet availability, laptop v.s smartphone access) as well as the client's level of comfort and familiarity with digital technology is key. Keep in mind that the cultural value of *respeto* (respect for authority figures) might inhibit Latinx clients from initiating a conversation about their needs. As clinicians, we must create a space for them to share their concerns about technology. Larger social and political contexts should also be considered like mental health stigma and immigration policies and enforcement. These contexts contribute to the fear and mistrust that Latinx families have about disclosing and sharing their information.

Practical Considerations for Telehealth with Latinx Clients and Families

During the global coronavirus pandemic of 2020, there was a rapid move toward the provision of mental health services predominantly via telehealth (e.g., video conferencing software). In our experience, Latinx families benefit from additional opportunities to learn and practice how to set-up telehealth sessions. The following are some practical considerations:

1. Take some time to learn if the client and caregiver have a working email address and help them create an email address if needed.

2. Have a written, step-by-step guide to the telehealth platform in Spanish and English.
3. Smartphones are widely used among the Latinx population and text messaging can be the most efficient and practical manner to share telehealth information.
4. Change the language settings on the telehealth platform to help reduce the language barrier.
5. To prepare for technological challenges with the client's primary device, explore whether there are family members who may allow the client to borrow another device.
6. Schedule additional time during your first telehealth session for a debrief to learn about the successes and challenges of using technology.
7. Latinx families encounter ongoing barriers to mental health treatment engagement. Frequently revisit the additional resources and supports the client may need related to changes in housing stability/living situation, financial resources, and access to digital health technology.

Personal Reflection

Consider the ways you might already use digital health technology in your own life. Perhaps you use a fitness tracking app to monitor your running progress, a menstrual cycle tracker for tracking ovulation, or a meditation app to remind you to practice mindfulness at the beginning of your workday. How have these applications helped you reach your goals or stay on track with habits you are trying to form? What value do they add to your day-to-day routine? For many people, the appeal of an application that both collects useful data about a behavior they are engaging in (e.g., running) and summarizes progress in visually appealing dashboards (e.g., increases in distance/endurance over time) reinforces the behavior and shows progress over time. Alternately, perhaps you have tried to use an application to support a new habit (e.g., meditation practice) but keep forgetting to use it. What factors influence how likely you are to use the app in your daily life? Does not using the application lead to any negative automatic thoughts about your ability to take care of yourself? What actions have you taken to try to promote using the application as planned (e.g., reminders/alarms)? Reflecting on our own use of digital health technology and how it has positively impacted your life can help us in supporting our clients in benefiting from technology as well. If a client expresses concern about using technology as part of their care, asking them about the ways they might already use digital technology in their life could alleviate their concerns and help them understand how it could be helpful for mental health recovery.

Now, consider the restrictions you have placed on the technology in your life. What is your comfort level with sharing your activity on social media? Have you changed your privacy settings or requested your data be deleted from a particular tool? Do you try to manage your screen time by limiting time spent on certain applications? Are there aspects of your life you keep entirely analogue? What about your approach to the terms & agreements for software tools and websites that you use – do you read them closely or happily accept without investigation? Finally, how do your answers to these questions differ from other people in your life? It is important to recognize that each of us will have different comfort levels and limits when it comes to digital health technology in our lives, and this will be true for our clients as well. Exploring their comfort level will help both provider and client identify the best way to integrate technology whilst also respecting personal limits.

Case example

Fernanda is a 15-year-old Latinx bilingual (Spanish and English) female-identifying client who experiences psychosis symptoms including suspiciousness/paranoia. Fernanda's goal for treatment is to reduce suspicious thoughts of feeling watched and someone trying to hurt her when nobody is around. In therapy sessions, she speaks English; at home she speaks Spanish. Fernanda attends sessions with her mother who is Spanish speaking only. Fernanda sought treatment at a specialty early psychosis clinic that uses the coordinated specialty care treatment model, including CBT for psychosis with a bilingual (Spanish and English) clinician.

Supporting the client and family in using telehealth

To help reduce transportation barriers, Fernanda and her mother agreed to telehealth sessions. Although Fernanda and her mother have their own smartphones, Fernanda's mother struggled to remember her email address password to set up a telehealth platform account. After an assessment of access to digital technology tools, primary language and preference, as well as comfort/familiarity with technology, Fernanda's mother was open to setting up a new email address with the clinician during the session. A plan was made to ensure that if Fernanda's mother's email address did not work then the telehealth platform information would be sent via text. Education about the telehealth platform was reviewed in Spanish with Fernanda's mother and in English with Fernanda. Informational handouts about the telehealth platform were also sent via text and email. After a few practice sessions with the support of the clinician and Fernanda's guidance at home, both Fernanda and her mother learned how to navigate the telehealth platform. A debrief check-out was

incorporated at the end of each practice session to ensure that concerns about technology use and access were discussed. This additional time also allowed for the client's siblings to greet the clinician (*personalismo*) and to share successes about using telehealth. During some of the practice sessions, it was common for Fernanda's older sister to help their mother log into their telehealth account for collateral sessions. Now Fernanda's mother can join telehealth sessions when she is at work. Both Fernanda and her mother expressed that this digital method allowed for Fernanda to attend sessions consistently and decreased Fernanda's guilt about her mother missing work for in-person appointments.

Using technology to facilitate therapy homework

During therapy, Fernanda identified that it would be helpful to track the frequency of her suspicious thoughts using a notebook. However, she would often not complete her therapy homework because she had either forgotten to carry her notebook with her or could not find it in the moment. Fernanda agreed use the notes app on her smartphone for tracking. Fernanda's mother also agreed to track symptom frequency in her smartphone to support Fernanda. Both Fernanda and her mother shared that using their smartphones was helpful since Fernanda did not like talking about symptoms in Spanish; sharing her experiences in English was less anxiety-provoking. Using her smartphone allowed Fernanda to write about her symptoms in English while the clinician mediated between Fernanda and her mother when reviewing the homework together. This method facilitated Fernanda and her mother to communicate about symptoms in their preferred language. With the switch to a smartphone, Fernanda completed her homework assignment consistently because she had her phone with her all the time. An additional and unanticipated benefit was that Fernanda felt more comfortable knowing that her information was private and protected by the passcode for accessing her phone.

Tracking her suspicious thoughts helped Fernanda and her clinician to develop a case formulation in Spanish and English. Her mother also contributed by tracking the observed impact on behaviors at home (i.e., hypervigilance, difficulty leaving the house for social occasions, sleeping difficulties, anxiety/panic attacks, and limited communication with family members). With the integration of digital technology, new discoveries were made about Fernanda's triggers, emotions, and beliefs. Specifically, Fernanda identified that on the days that her suspiciousness increased she had more school related stress due to exams and difficult homework assignments. This information was discussed in session which allowed Fernanda's mother to better understand where Fernanda's anxious emotions and behaviors were coming from. Fernanda's mother was then able to externalize Fernanda's behaviors versus internalizing them (i.e., believing that Fernanda didn't care about the family).

Using digital tools to support cognitive restructuring

Using the audio recording and notes apps on her smartphone, Fernanda practiced cognitive restructuring by recording the evidence for and against her suspicious thoughts in real time. Using her smartphone also helped overcome memory difficulties when recalling past situations and cognitions related to suspiciousness. The audio recordings and notes app were reviewed in sessions and incorporated in thought records to further examine the suspiciousness. Fernanda identified the belief that *“if someone starts a conversation with me during family gatherings then this means they are trying to plot a way to share information with someone to harm me”*. Fernanda was able to discern that sometimes her suspicious thoughts were not accurate or helpful. This led to the development of alternative thoughts regarding why family members might start conversations with her (e.g., *“they want to get to know me, spend quality time since with me, they are also making conversations with others, and no one is getting hurt”*). As a result, her social anxiety decreased. Ultimately, when Fernanda was struggling to identify alternative cognitions in social situations, she practiced evaluating the pros and cons of paying attention to her suspicious thoughts in social situations. Fernanda then used a phone alarm for a daily reminder to practice this cognitive skill, regardless of whether she was in a social situation or not.

Supporting client in choosing the right digital technology tools

Over time, Fernanda and her clinician explored different smartphone apps that would remind her to track her symptoms and practice a variety of coping skills as part of her recovery. Fernanda’s clinician supported her in exploring her level of comfort and knowledge around data sharing and privacy practices, and together they researched possible apps that could support Fernanda in consistently implementing her wellness plan.

In the end, it was evident that without the access and utilization of digital tools like a smartphone device, Fernanda would have struggled tremendously in practicing cognitive and behavioral skills in her everyday life. Similarly, treatment progress would have been slower and problematic, making the possibility of cognitive shifts in the treatment of her delusions challenging. Importantly, Fernanda was able to continue using digital health technology to independently manage her wellness after graduating from therapy.

Summary & Conclusions

Digital health technology has the potential to address long standing challenges of access to, engagement in, and effectiveness of treatment for psychosis. Research evidence at the time of writing demonstrates individuals with psychosis

are interested in and willing to use digital technology as part of their treatment, and that digital health technology can facilitate treatment engagement and symptom monitoring, improve negative and cognitive symptoms, and improve social and occupational outcomes. Integrating digital health technology into clinical practice does not have to involve complex software applications or expensive wearable equipment. Incorporating existing applications on client smartphones such as note taking apps, reminders, and voice memo recordings into the treatment approach can facilitate measurement-based care and support clients in remembering to complete therapy homework and practice coping skills. When choosing a digital health technology tool to use, we recommend working with your clients to consider aspects such as cost, access, ease of use, data security and privacy, and any relevant cultural and linguistic factors that could impact the client's willingness to use the selected tool. Using digital health technology tools to enhance and support standard treatment approaches can lead into more effective and meaningful interventions tailored to the client's daily experiences and recovery goals.

Discussion Questions

1. Think about a client you are working with currently – how might you use digital health technology to support their treatment progress?
2. What are some of your own preconceived notions and cultural biases about technology that might impact the way you implement digital health technology tools in your treatment approaches?
3. When working with Latinx clients who come from a heterogenous group, it is essential to complete a comprehensive assessment of cultural values and beliefs, acculturation, language preference, and access to technology (i.e., smartphone, laptop, or tablet). What are some of your anticipated concerns in completing an assessment of cultural and language needs for the use of technology in clinical care?

Table 1. Ways to Integrate Technology into CBT Practice

Benefit of Technology	Clinical Practice / Intervention	What We Do Now	What Tech Could Help Us Do	Technology Options
<p>1. Increase Client Engagement During Data Collection</p>	<ul style="list-style-type: none"> • Building a Case Formulation • Intervention selection • Psychoeducation tailored to the client's experiences and symptom profile 	<ul style="list-style-type: none"> • Complete clinician-directed assessments in session • Administer questionnaires or homework exercises that can be long and hard to track with paper forms and / or workbooks. 	<ul style="list-style-type: none"> • Create user-friendly questionnaires using software where the layout can be customized (colors, fonts, display) • Use survey building software that allows you to show or hide questions to clients based on their previous answers -- which saves time and energy • Use smartphone applications that send surveys automatically at selected intervals for information collection • Provide feedback to clients' responses in real time with automated scoring (e.g., display an activity score with a short explanation, generate a battery score with a description of what it means) -- so that the questionnaires feel more interactive and personalized. 	<p>BEGINNER</p> <ul style="list-style-type: none"> • Interactive PDF forms (\$) <p>INTERMEDIATE</p> <ul style="list-style-type: none"> • Survey design software (\$\$) • Smartphone application for survey delivery (\$ - \$\$) <p>ADVANCED</p> <ul style="list-style-type: none"> • Developing your own application (\$\$\$) [<i>Not recommended!</i>]
<p>2. Provide Innovative Options for Client Self-Reflection</p>	<ul style="list-style-type: none"> • Symptom monitoring • Building a case formulation • Intervention selection • Intervention design (e.g., designing behavioral experiments) 	<ul style="list-style-type: none"> • Assess any symptoms experienced since the previous session as part of session check in. • Promote self-reflection by posing introspective questions in sessions, using Socratic methods. • Assign clients homework to track symptoms using paper forms in between sessions. Encourage clients to keep a paper journal or track symptoms in between sessions on paper in some way. 	<ul style="list-style-type: none"> • Asking clients to write things down in an electronic platform as simple as MS Word or the notes application on their smartphone can be quicker and easier for them than using a paper and pen. • Allows clients to search multiple entries for keywords or ideas if they want to find a thought or return to an idea they've previously recorded. • Makes sharing reflections with others nearly effortless. • Some apps can ping clients at pre-set times reminding them to take a moment to self-reflect. • Other apps have pre-set questions designed to prompt deeper thinking. 	<p>BEGINNER</p> <ul style="list-style-type: none"> • Digital note taking software (\$) • Note-taking apps that set alarms for reflection reminders (\$) <p>INTERMEDIATE</p> <ul style="list-style-type: none"> • Online reflection journals that can be private or shared (\$) • Habit tracking apps that help clients reflect on behaviors over time (\$) <p>ADVANCED</p> <ul style="list-style-type: none"> • Audio transcription apps that convert spoken words into text (\$\$)
<p>3. Create More Immersive</p>	<ul style="list-style-type: none"> • Relaxation skills 	<ul style="list-style-type: none"> • Use worksheets that describe the skill • Practice skills live in session 	<ul style="list-style-type: none"> • Provide structured guidance for simple breathing exercises at appropriate 	<p>BEGINNER</p>

<p>Practice Options for Building Coping Skills</p>	<ul style="list-style-type: none"> • Mindfulness skills • Emotion identification skills • Emotion regulation skills • Distress Tolerance Skills 	<ul style="list-style-type: none"> • Use publicly available relaxation or mindfulness guidance videos (e.g., on YouTube) Few options for engaging clients in somatic work currently exist. 	<p>points in a session with apps that offer preset options for different breathing intervals, accompanied by soothing sounds or images to keep clients on track.</p> <ul style="list-style-type: none"> • Provide bio-feedback to clients in session through the use of simple devices for CV monitor (HR, Pulse, Oximeter) so that they develop a stronger connection between their mental and physiological states. • Use virtual reality headsets to submerge them in calming or stimulating spaces, transport them to different environments and worlds when they feel anxious, stuck, or shut down. 	<ul style="list-style-type: none"> • Meditation or guided breathing apps (\$) <ul style="list-style-type: none"> INTERMEDIATE <ul style="list-style-type: none"> • Heart rate monitors, pulse detectors (\$\$) ADVANCED <ul style="list-style-type: none"> • Virtual reality or augmented reality headset experiences (\$\$\$)
<p>4. Predict Client Behavior More Accurately</p>	<ul style="list-style-type: none"> • Wellness planning / Relapse Prevention • Creating “cope ahead” plans • Selecting appropriate interventions 	<ul style="list-style-type: none"> • Provide psychoeducation on vulnerability-stress model • Identify symptom patterns based on in session assessments and homework assignments (typically completed on paper) • Use paper worksheets to create a client specific wellness plan. We use key pieces of information about our clients when making assessments and plans, but what we attend to and remember can be subject to information overload, cognitive bias, selective attention, and memory loss. 	<ul style="list-style-type: none"> • Explore how different client variables are and are not related to each other. • Use data analysis software to describe client experiences and predict client outcomes. • Develop machine learning algorithms that can anticipate client behaviors and needs (e.g., how likely they are to respond to a particular type of treatment, what types of exercises they are most likely to enjoy) 	<ul style="list-style-type: none"> BEGINNER <ul style="list-style-type: none"> • Data spreadsheets like Excel that allow for formula entry and analyses (\$) INTERMEDIATE <ul style="list-style-type: none"> • Statistical software programs (\$ - \$\$\$) ADVANCED <ul style="list-style-type: none"> • Analytic software that allows for complex model building (\$ - \$\$\$)
<p>5. Visualize Important Takeaways</p>	<ul style="list-style-type: none"> • Building case formulation • Evaluating outcome of interventions (e.g., reviewing results of homework assignment) • Planning new interventions 	<ul style="list-style-type: none"> • Use case formulation worksheet in session to visualize relationships between triggers, symptoms, maintenance factors, etc. • Use whiteboard in session to visualize key concepts discussed in session • Verbal discussions around treatment progress and change. 	<ul style="list-style-type: none"> • For quantitative data, you can present graphs and other visualizations that represent important takeaways such as how a client’s experiences are changing over time or how a client compares to other relevant groups. • For qualitative data, you can use text analyses software to identify what words a client uses most when writing in a self-reflection journal or responding to open ended questions in a survey (e.g., word clouds) • More sophisticated technology can create diagrams that represent social networks, the relationships between ideas, and customized decision trees. 	<ul style="list-style-type: none"> BEGINNER <ul style="list-style-type: none"> • Data spreadsheet software like Excel (\$) • Free word cloud generators (\$) INTERMEDIATE <ul style="list-style-type: none"> • Statistical software programs (\$ - \$\$\$) ADVANCED <ul style="list-style-type: none"> • Analytic software that allows for complex model building (\$ - \$\$\$)

<p>6. Build Broader Social Networks</p>	<ul style="list-style-type: none"> • Increasing Social support • Normalization & stigma reduction • Behavioral Activation • Social skills training 	<ul style="list-style-type: none"> • Assign socialization homework in session • Provide psychoeducation about symptoms to normalize and destigmatize • Engage client in peer support groups • Engage client in Cognitive Behavioral Social Skills Training (CBSST) • Facilitate family engagement in treatment. 	<ul style="list-style-type: none"> • Organize group messaging chains to share resources, advice, or important information. • Connect clients to broader social networks via discussion boards, social media pages, or community workspaces • Building customized or private websites that have discussion boards which are professionally moderated 	<p>BEGINNER</p> <ul style="list-style-type: none"> • Group messaging platforms such as text or email (\$) <ul style="list-style-type: none"> • Peer led communities on social media platforms (typically free) <p>INTERMEDIATE</p> <ul style="list-style-type: none"> • Apps and software that allow group interaction and collective workspaces (\$) <p>ADVANCED</p> <ul style="list-style-type: none"> • Professional website software (\$\$)
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