Expanding the Reach of Evidence-Based Psychotherapy Through Remote Technologies

Bridget Poznanski, Karina Silva, Kristina Conroy, Christopher Georgiadis, and Jonathan S. Comer

Abstract

The present chapter provides an overview of (and supporting evidence for) leading formats of technology-involved youth mental health intervention, followed by a discussion of key cautions and concerns that warrant careful consideration at this early stage of digital technology-involved care. Although there has been much progress in the development and evaluation of evidence-based treatments for child and adolescent mental health problems, limitations in the accessibility and acceptability of supported care have significantly restricted actual service utilization among affected youth. In recent years, extraordinary advances in telecommunications and the increasing ubiquity of digital technologies in daily life afford new opportunities for meaningfully extending the reach and scope of supported youth mental health care. Remote technologies have potential to liberate mental health treatments from their traditional geographic confines and overcome geographic disparities in the mental health workforce, increase the cost-effectiveness of care, and expand the ecological validity and generalizability of care by affording in situ intervention, and systematically extend treatment engagement and skill rehearsal to children’s natural settings. The authors conclude by examining exciting new frontiers on the horizon for the incorporation of digital technologies into children’s mental health care.

Although there has been much progress in the development and evaluation of evidence-based treatments (EBTs) for child and adolescent mental health problems, limitations in the accessibility and acceptability of supported care have significantly restricted actual service utilization among affected youth (Merikangas, et al., 2010; Merikangas, et al., 2011). There are grossly inadequate

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numbers of mental health providers (Kazdin & Blase, 2011), and the majority practice in major academic hubs or metropolitan regions (Comer & Barlow, 2014). Cost, transportation, and stigma-related obstacles further interfere with service utilization (Salloum, Johnco, Lewin, McBride, & Storch 2016). Among families who are able to access care, long waitlists and high turnover slow the speed and flow of service delivery. Moreover, when families do receive care, obstacles to effective dissemination and implementation often limit the quality (Comer & Barlow, 2014).

In recent years, extraordinary advances in telecommunications and the increasing ubiquity of digital technologies in daily life afford new opportunities for meaningfully extending the reach and scope of supported youth mental health care (Doss, Feinberg, Rothman, Roddy, & Comer, 2017). Rapid developments in Internet connectivity, remote technologies, mobile devices, big data sensing, user-centered design, automated interactivity, and computational processing capacities have collectively set the stage for a possible digital mental health “revolution” (Mohr, Riper, & Schueller, 2018, p. 113). It has been argued that remote technologies have potential to liberate mental health treatments from their traditional geographic confines and overcome geographic disparities in the mental health workforce, increase the cost-effectiveness of care, and expand the ecological validity and generalizability of care by affording in situ intervention, and systematically extend treatment engagement and skill rehearsal to children’s natural settings (Chou, Bry, & Comer, 2017; Comer & Barlow, 2014; Kazdin & Blase, 2011). At the same time, the implementation of digital technology-involved interventions is still a new and rapidly shifting area, and much remains to be learned about the proper integration of modern telecommunications technologies into children’s mental health care.

Against this backdrop, the present chapter provides an overview of (and supporting evidence for) leading formats of technology-involved youth mental health intervention, followed by a discussion of key cautions and concerns that warrant careful consideration at this early stage of digital technology-involved care. We conclude with an eye toward exciting new frontiers on the horizon for the incorporation of digital technologies into children’s mental health care.

**State of the Evidence**

Given the initial promise of remote technologies to overcome many traditional barriers to accessing and engaging in evidence-based mental health care, a number of studies over the past decade have investigated the use of technology in mental health service provision. The behavioral intervention technology (BIT) formats that have received the most empirical attention include (1) telemental health interventions that afford synchronous interactions between patients and providers and (2) self-administered, automated, or asynchronous BITs (see Doss et al., 2017). Telemental health interventions refer to synchronous mental health services that utilize videoconferencing, telephone, or other remote communication technologies in order to deliver patient-provider mental health services in real time (Myers et al., 2017). In contrast, automated or asynchronous BITs do not leverage real-time patient-provider communications; some are fully self-administered or technology-driven without human coaching or guidance, whereas others afford patient-provider back-and-forth communications that do not necessarily unfold in real-time. These latter BITs can also be used to augment or enhance synchronous treatments (e.g., providers using text messaging or applications to send homework reminders; patients using technologies to send progress updates or symptom reports; see Doss et al., 2017).
**Telemental Health Interventions**

Telemental health interventions use real-time telecommunication technologies, such as videoconferencing platforms and telephones to deliver “live” mental health services. Videoconferencing provides high-quality two-way interactions that mirror traditional face-to-face care. Given the emphasis in many evidence-based psychotherapies on verbal and visual information, the high-quality audio and visual information afforded by modern videoconferencing has rapidly improved the acceptability and feasibility of telemental health delivery of EBTs (Comer, Elkins, Chan, & Jones, 2014).

In recent years, an increasing number of studies has demonstrated strong evidence for the use of videoconferencing-based telemental health formats to treat child and adolescent mental health problems (e.g., Carpenter, Pincus, Furr, & Comer, 2018; Comer, Furr, Kerns et al., 2017; Comer, Furr, Miguel et al., 2017; Himle et al., 2012; Myers, Vander Stoep, Zhou, McCarty, & Katon, 2015; Sibley, Comer, & Gonzalez, 2017; Vander Stoep et al., 2017). Overall, there is considerable support for telemental health interventions via videoconferencing in the effective delivery of mental health care (Mohr, Burns, Schueller, Clarke, and Klinkman, 2013a). Research suggests that telemental health formats of EBTs, which can be delivered with fidelity, are associated with strong satisfaction, and can result in comparable (or sometimes even improved) outcomes relative to traditional face-to-face EBTs, with moderate to large effect sizes.

In one promising example of evidence-based telemental health, Internet-delivered Parent–Child Interaction Therapy (I-PCIT; Comer et al., 2015) utilizes videoconferencing to deliver in-home well-supported parent training to families of young children with disruptive behavior problems. In traditional clinic-based PCIT, the provider observes the family in a therapeutic playroom from behind a one-way mirror and provides live parent-coaching through an earpiece. In contrast, in I-PCIT the family is in their own home throughout treatment and uses a webcam and a secure videoconferencing platform to stream real-time parent–child interactions to a remote I-PCIT provider, who provides real-time coaching to parents on skill provision via Bluetooth earpieces. Not only does this paradigm extend the reach of PCIT, but providing live, in-home coaching can also enhance the ecological validity of care by treating families in the settings in which the learned techniques are ultimately implemented. In fact, in a recent randomized clinical trial (RCT) comparing I-PCIT to traditional clinic-based PCIT, both treatments were associated with high satisfaction and improved child behavior (Comer, Furr, Miguel et al., 2017). However, I-PCIT was associated with fewer parent-reported barriers to care and had a significantly higher rate of “excellent responders” as rated by independent evaluators masked to treatment condition.

Telemental health interventions utilizing videoconferencing have been used to treat a wide range of other child and adolescent mental health concerns, including anxiety disorders (Carpenter et al., 2018), obsessive-compulsive spectrum disorders (Comer, Furr, Kerns et al., 2017; Himle et al., 2012), depression (Duncan, Velasquez, & Nelson, 2014), and attention-deficit/hyperactivity disorder (Sibley et al., 2017). Telemental health paradigms have also been used as a platform for expanding the reach of expert consultation and supervision to enhance care in remote and low resource areas (for a review, see Hoeft, Forney, Patel, & Unutzer, 2018).

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**Self-Administered, Automated, or Asynchronous BITs**

While telemental health services focus on real-time patient-provider communications, increasingly popular BITs use technology to allow self-administered and/or automated care, or to afford asynchronous patient-provider communication. Self-administered or automated BITs represent an
important innovation in the dissemination of evidence-based care, as such “person-less” platforms have the potential to overcome person-power issues in the mental health workforce (Kazdin & Blase, 2011) as well as stigma-related concerns. These BITs can be delivered through computer programs, online, and mobile applications, and can be accessed on a range of devices (e.g., laptops, tablets, smartphones, wearables; see Comer et al., 2019). The delivered content can range from general information and psychoeducation about youth mental health problems and strategies for coping, to individualized feedback and supports based on unique client responses and/or sensor data.

Meta-analyses and systematic reviews of research on automated computer-based programs indicate positive treatment effects, with small to moderate effects noted for computerized cognitive behavioral therapy (CBT) for depression ($g = 0.16−0.62$) and moderate to large effects for anxiety ($g = 0.53–1.41$), and larger effects ($g = 0.95$) for adolescents than children ($g = 0.51$; Hollis et al., 2017). Yet, the evidence for self-guided BITs for other mental health concerns (e.g., autism spectrum disorder [ASD] and psychosis) remains questionable (Hollis et al., 2017). Importantly, the research summarized in these meta-analyses and systematic reviews has mostly focused on relatively early computer programs for children’s mental health that require somewhat traditional styles of participation (e.g., sit down treatment, hour long “sessions”). In more recent years, BITs have utilized other modern technologies, including mobile platforms, automated interactivity, smart prompts, sensors, and in situ intervention (Comer et al., 2019).

Given increased usage and ubiquity of mobile devices (e.g., smartphones, tablets; Pew Research Center, 2017), regardless of many socioeconomic factors, and the unique technological capabilities they afford, much of the recent development and investigation of automated BITs has focused on mHealth (Mohr et al., 2013a), or the utilization of mobile apps. Mental health apps can provide increased, consistent, and in situ access to mental health supports at relatively low costs, while bypassing stigma-related concerns about seeking mental health support (Munoz, 2010). With the economic success of the mobile marketplace, there has been a proliferation of mobile apps marketed to treat a range of child and adolescent mental health problems. Importantly, rapid advances in mobile technologies and app development are far outpacing the speed with which the researchers are conducting formal evaluations of mHealth options, and the marketplace has been inundated with apps of questionable evidence (Grist, Porter, & Stallard, 2017). One recent systematic inventory identified 121 unique mobile apps available in the Google Play or Apple store that were marketed for child and adolescent anxiety (Bry, Chou, Miguel, & Comer, 2018). Roughly 80% of these apps included no content related to exposures, and roughly 80% included no content related to thought challenging (Bry et al., 2018). Indeed, there is a critical need to apply more efficient research strategies to allow for swifter and more agile evaluations of commercially available mHealth products that can respond to the rapidly shifting marketplace (e.g., micro-randomized trials for apps; Klansnja et al., 2015).

Patient usage and ongoing engagement with self-administered or automated BITs have proven to be relatively poor in the absence of at least some level of human support (Zarski et al., 2016). Guided BITs (i.e., BITs that incorporate support from a therapist or coach, typically by phone or text) have been shown to increase patient BIT use and enhance treatment outcomes (Schueller, Tomasino, & Mohr, 2016). Still, the level of support in guided BITs varies across programs, ranging from the consistent engagement of a therapist throughout the intervention, to as-needed support, to support that strictly address technology issues. As with automated or self-administered BITs, guided BITs combat many traditional barriers to care, yet, they permit more flexible responsiveness to individual needs, add external accountability for engagement, and introduce an interpersonal quality to care that can be helpful. The addition of therapist support and guidance in BITs has been associated with increased service satisfaction (Aardoom et al., 2016) and treatment adherence (Zarski et al., 2016), including more time spent on the platform or completion of treatment modules (Danaher & Seeley, 2009). Moreover, parent and family-focused guided BITs have been effective in reducing a range of child
problems, including anxiety, depression, and behavior problems, and in enhancing positive parenting strategies and the parent–child relationship. Studies of youth-focused guided BITs also suggest such formats may be helpful in the management of disordered eating and ASD-related problems, although more research is needed on these fronts (MacDonell & Prinz, 2017).

Technology-augmented care, also called technology-enhanced care (Anton & Jones, 2017), refers to the incorporation of BITs to complement traditional synchronous therapy, often for the purpose of enhancing client engagement and out-of-session skill utilization. For example, a course of traditional face-to-face therapy might be augmented with the concomitant use of an app that helps the patient track and monitor their out-of-session behavior, thoughts, and mood (Muñoz, 2010). In such formats, the therapist often also has access to remotely monitor these patient trackers through the platform, and can provide asynchronous responses or prompts for the patient on their own time (e.g., Reid et al., 2011). Additionally, technology-augmented care may be an important avenue to increase engagement among patients or families at high-risk of attrition (Gardner et al., 2009). For example, Jones and colleagues (2014) have developed a technology-enhanced behavioral parent training program that works to promote increased engagement in face-to-face treatment among highly stressed, low-income families. Their clinic-based parent training program is augmented with a smartphone platform that houses skill videos, daily surveys, and text message reminders regarding homework and skill utilization. In addition, the platform facilitates midweek video calls and enables the family to upload videos of their home practice for their provider to view. Jones and colleagues (2014) have found that families receiving such technology-enhanced parent training show improved outcomes relative to those receiving just face-to-face parent training. Families receiving their technology-enhanced parent training program were also able to complete the treatment program more quickly (Jones et al., 2014), which is particularly promising from a cost-effectiveness perspective.

Considerations, Concerns, and Cautions

The incorporation of technology into children’s routine mental health care has been a relatively recent advance, and as such a number of relevant procedural matters have yet to be resolved (Comer & Barlow, 2014; Doss et al., 2017). In the absence of consensus guidelines for the incorporation of technology into youth’s mental health care, we now turn our attention to key considerations, concerns, and cautions as they relate to (a) matters of treatment adherence and process, (b) logistical barriers, (c) cultural competency, and (d) ethics, security, and safety.

Matters of Treatment Adherence and Process

Patient engagement and adherence, or the degree to which patients utilize intervention content, is a paramount issue in all psychological treatments, but is an area of elevated concern when remote technologies separate the patient from the provider, or replace the provider altogether (Zarski et al., 2016). Mohr, Cuijpers, and Lehman (2011) introduced a theoretical model of “supportive accountability” that outlines the benefits of incorporating at least some level of human scaffolding and responsiveness in technology-based treatments. Human involvement in BITs has been shown to improve engagement and adherence (Mohr et al., 2013a; Tate & Zabinski, 2004), yet the type of support (e.g., support over the phone versus online forum) has not been shown to impact outcomes (Titov et al., 2010), and the optimal “dose” of this supportive accountability remains unclear.

Moreover, when surveyed, providers have cited concerns that the technological aspects of care could negatively impact the therapeutic alliance (Becker & Jensen-Doss, 2013; Perle, Langsam, &
Nierenberg, 2011). Many report that they believe technology could interfere with their ability to show empathy, result in inflexible treatment applications, and limit their therapeutic style (Becker & Jensen-Doss, 2013). Contrary to such therapist concerns, however, research suggests that therapeutic alliance during telemental health treatments and guided BITs can be equivalent to (or even superior to) that observed in face-to-face treatments (Andersson et al., 2012; Comer, Furr, Miguel et al., 2017; Cook & Doyle, 2002; Jenkins-Guarnieri, Pruitt, Luxton, & Johnson, 2015). Similarly, evaluations of alliance in technology-augmented treatments have found that technology not only maintains alliance, but has the potential to improve alliance over the course of treatment (Anton & Jones, 2017). Taken together, although some providers express concerns that integrating technology into practice may interfere with rapport and therapeutic alliance, there is little evidence that this is the case.

Logistical Barriers

At present, a number of logistical barriers threaten the broad dissemination and implementation of technology-involved treatments. First, technological advances and innovations in technology-based treatments have largely outpaced the development of corresponding standards and regulations for implementation (Comer & Barlow, 2014; Doss et al., 2017). The American Psychological Association (2013) published “Guidelines for the Practice of Telepsychology” relatively recently, but it is already dated, and the majority of states have very limited telehealth or telepsychology statutes or regulations governing practice (American Psychological Association, 2013; Anton & Jones, 2017; Myers et al., 2017). Given the rapid evolution of technology and clinical innovation, there is a critical need for professional organizations to provide monitoring of technology-involved treatments and more frequent incremental guideline updates that are responsive to the shifting marketplace and practice trends.

Second, variable access to technology across patients and across providers present further obstacles to technology-involved mental health care. Although the majority of mental health clinicians report access to a desktop computer and high-speed Internet, far fewer report access to tablets, videoconferencing equipment, and virtual reality equipment (Becker & Jensen-Doss, 2013). Furthermore, many providers remain concerned that they do not have adequate information technology (IT) support for knowledge and skill building (Ramsey, Lord, Torrey, Marsch, & Lardiere, 2016). Disparities in technological access and technological literacy across the general population also limit the spectrum of patients who are able to participate in technology-involved care (Ramsey et al., 2016), and digital divides remain based on income, education, and age in the United States (Poushter, 2016). Accordingly, providers must be thoughtful about incorporating technology into mental health care in a way that does not reinforce current health disparities in the U.S.

Third, payer issues and policies related to technology-involved care remain problematic. Reimbursement of telemental health services and BITs by third-party payers is inconsistent, partially due to inconsistent language surrounding various modalities of telemental health and narrow definitions of what constitutes technology-engaged mental health services (Baker & Bufka, 2011). Encouragingly, public insurers (e.g., Medicaid) reimburse for telemental health services in most U.S. States, although many private insurance companies do not cover these services. Still, the inconsistency in coverage and reimbursement rates across states may hinder providers from integrating technology into their practices. For example, some states and insurance companies require documentation that one lives in a federally designated mental health workforce shortage area to ensure telemental health coverage (Comer & Barlow, 2014), despite the myriad of advantages of telemental health that extend beyond regional disparities in care.
Finally, the ability afforded by technology to provide remote interventions that transcend geographic confines can be at odds with current practice regulations. Providers must be aware of how specific state laws and regulations related to the delivery and receipt of telemental health services might impact their ability to treat a given patient. Currently, most states in the U.S. allow psychologists to provide temporary interjurisdictional service, yet, most state licensure regulations restrict psychologists from providing telemental health services across state lines for more than 30 days (Campbell & Norcross, 2018). Encouragingly, the Association of State and Provincial Psychology Boards (ASPPB) has been developing a plan called the Psychology Interjurisdictional Compact (PSYPACT) which promotes licensure reciprocity across state lines to allow providers to deliver telemental health services in states in which they are not directly licensed (Association of State and Provincial Psychology Boards, 2016). Licensed psychologists in any PSYPACT-participating states are permitted to practice telemental health with patients in any other PSYPACT-participating state.¹

Cultural Competency

As technology continues to expand the reach of treatment and broaden the range of patients and geographical regions that can be treated, it is likely that providers will increasingly treat patients who are from different regions, cultures, and linguistic backgrounds from their own. To date, very little work evaluating technology-involved treatment has considered cultural factors and the increased importance of culturally sensitive and responsive care (Barnett & Kolmes, 2016; Chou et al., 2017). Trainings in technology-involved treatments need to better emphasize cultural sensitivity to individual differences as technology affords the opportunity to intervene with more diverse patient populations (Barnett & Kolmes, 2016).

Ethics, Security, and Safety

Providers incorporating remote technologies must still follow informed consent procedures, however, additional matters warrant special attention. For example, providers must inform patients exactly how information that may be recorded will be used, stored, and accessed. Jurisdictional variations differentially inform the required consent processes; for example, some states have different informed consent policies for technology-based versus face-to-face patients. At a minimum, providers should include additional information regarding safety planning, specific billing details, and confidentiality limitations, including the storage and destruction of electronic patient data (Campbell & Norcross, 2018). Telemental health care often involves remote delivery of treatment to non-supervised settings (e.g., patient homes), and thus providers must establish explicit contingency plans with their patients at the outset of treatment that specifies how (a) clinical emergencies will be handled, and (b) who specifically the provider will contact if they are unable to establish/re-establish connection with a patient and have concerns about their welfare (Baker & Bufka, 2011; Campbell & Norcross, 2018).

Providers should also consider the extent to which they are equipped to deliver technology-involved treatment prior to agreeing to provide such services. Beyond the clinical competence necessary to provide face-to-face mental health services, technology-involved treatments require provider technological competency in order to be delivered ethically and responsibly. The APA Guidelines for

¹At the time of submission of this handbook, the COVID-19 pandemic has loosened state regulations and insurance reimbursement policies for telehealth. Much is being learned and expansion of telemental health care services for evidence-based treatments may be expected in the future.
the Practice of Telepsychology urge providers to further their clinical tool-belt by pursuing training and supervision in telecommunication (American Psychological Association, 2013). Further, tele-mental health and guided BITs providers must take proper precautions when using technology to transmit and store patient data. Data collected from psychological services (e.g., video recordings of treatment sessions) may be at risk of unintentional disclosure, particularly if data are unencrypted or stored on a personal device. Providers should prepare for responsible data storage, including encryption and password-protected and secure storage methods, in order to protect patient data and to ensure it is properly disposed of after the patient is no longer in their care (American Psychological Association, 2013). Moreover, providers administering telemental health will have less agency in protecting a patient’s privacy within a session, and therefore care must be taken to ensure that patients understand the risks associated with receiving services at home or in the community, such as another individual in the home inadvertently overhearing session content (American Psychological Association, 2013).

Rapid Technological Advancement and New Horizons

As technological advancements and societal dependence on technology increase, field experts are consistently developing new methods of using technology to reach children and adolescents. For example, advances in artificial intelligence (AI) are quickly changing the sophistication of modern BITs. AI refers to computer systems composed of algorithms that perform tasks normally conducted by humans, such as decision-making, speech recognition, and language translations. (Fitzpatrick, Darcy, & Vierhile, 2017) Advances in AI are providing researchers and providers increasingly innovative ways of collecting and analyzing data, and developing interventions.

Machine learning (ML) uses AI to predict algorithms and calculate the probability of future occurrences. ML has the ability to identify multiple prognostic sets of variables and models to predict later outcomes. (Karstoft, Galatzer-Levy, Statnikov, Li, & Shaley, 2015). ML has been used in the computer science field for many decades, but has only recently been introduced into mental health care. Some of the most exciting applications of ML in mental health care has been its use in the prediction of suicide risk and self-harm. For example, Walsh, Ribeiro, and Franklin, (2017) used ML to identify and improve upon algorithms that could more accurately predict future suicide attempts, forecasting from 720 days to 7 days prior to the attempt.

Just in Time Adaptive Interventions (JiTAIs) use mobile technologies and sensor data to identify in-the-moment opportunities for acute intervention and provide real-time and immediate support in situ (Nahum-Shani et al., 2018; see also Comer et al., 2019). Using sensing technology, JiTAIs detect changes in the patient and/or their environment, and immediately intervene according to an established protocol during states of vulnerability and opportunity. For example, over the weekend a JiTAI might be programmed to continuously monitor an adolescent’s physical activity via a smartphone or smart band accelerometer data, and at moments of extended inactivity a smart prompt might be sent to the adolescent to engage in some brief form of physical activity (e.g., “you’ve been sitting for a while—go do 10 jumping jacks” or “take a quick walk around the block”). In recent years, JiTAIs have been developed to reduce alcohol abuse, anxiety, and obesity, although this research has almost exclusively been conducted in adult samples (Nahum-Shani et al., 2018).
Conclusion

The incorporation of technology into child and adolescent mental health care presents tremendous opportunities for meaningfully extending the reach and scope of evidence-based care, and has already begun to enhance the accessibility and acceptability of supported interventions for youth in need. Some technology-based treatment formats, such as telemental health and technology-augmented care, have already received considerable empirical support in the treatment of common child and adolescent mental health concerns, with moderate to large effects (e.g., Comer, Furr, Kerns et al., 2017; Comer, Furr, Miguel et al., 2017; Jones et al., 2014). Other platforms, such as guided BITs, are receiving increasing support, while poorer engagement associated with fully self-administered or automated BITs continue to be an area of investigation.

The first wave of technology-involved treatment was largely focused on examining whether supported traditional face-to-face intervention methods could be mirrored (or enhanced) in remote contexts using telecommunication technologies. The tacit question underlying this work has been “Can we replicate the great things we do in the clinic using computers or over the Internet?” In recent years, the focus has shifted to considering how emerging technologies can actually offer new clinical opportunities that were never afforded in traditional face-to-face care. In the context of transformative advances in remote sensing, computing technology, and computational modeling, some of the most exciting innovations in technology-involved treatment are examining intervention methods that not too long ago might have felt like science fiction. This new wave of technology-involved intervention is exciting, but warrants a rigorous empirical scrutiny to substantiate its benefits before it can be considered a credible and effective complement to the portfolio of youth mental health intervention options.

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